EDITORIAL

PENNSYLVANIA crude oil sold for $4 per barrel on February 8, the first time it has reached that price since December 13, 1876. It is interesting to note that the production of oil in Pennsylvania in 1876 and in 1917 was about the same, appproximately 8,000,000 barrels. In 1876, however, most of the oil produced in the United States came from Pennsylvania, while at the present time only a small fraction of the total production comes from that State.

'SKIP-STOPS' for street-cars as a means of fuel conservation have been proposed by the Federal Fuel Administration. The usual practice of stopping cars at every street-crossing is a relic of the old horse-car days, when such frequency of stopping made practically no difference. Nowadays, it takes about three times as much power to stop and start a car as to run it a block at the ordinary speed. Omitting every other stop would save 1,500,000 tons of coal per year. There would be some inconvenience to passengers, but this would be largely compensated by the greater average speed possible on account of the decreased number of stops.

AEROPLANES for carrying mail are the subject of a call for bids recently issued by the Post-Office Department. The specifications call for five machines, each capable of carrying 300 pounds of mail a distance of not less than 200 miles, non-stop, maximum speed under full load, 100 miles per hour, minimum speed under full load, 45 miles per hour, climbing speed 6000 feet in 10 minutes, equipped with a 150-horse-power motor. Such specifications would have sounded like a fairy tale a few years ago, but presumably there are hundreds of machines now in France that could satisfy these conditions.

FOOD CONSERVATION presents a way by which all of us can help to win the War. For many, it is the most important way. Much has been accomplished, but much more must be accomplished if our Allies and our own soldiers are to be fed. So far, conservation has been voluntary or by relatively gentle forms of moral and other suasion. Let us hope that this condition may continue and that troublesome and time-wasting food-cards need not be adopted. This can, however, be accomplished only by the most complete voluntary co-operation. The Food Administration has issued the following suggestions for a voluntary honor ration per person per week: two pounds of meat, seven ounces of butter, seven ounces of fat and seven ounces of wheat flour for cooking, three pounds eight ounces of bread or mixed cereals, and twelve ounces of sugar. No limit, of course, is placed upon fruit, vegetables, fish, and other perishable products. This ration should not inconvenience anyone, but if it does, remember that there are others who are giving their lives for the same cause.

The Status of the Engineering Profession and the Licensing of Engineers

Two of the most important steps ever taken by the local Association of Members of the American Society of Civil Engineers were, first, the discussion, both by a general meeting and by a specially-appointed committee, of the status of the engineering profession, and, second, the appointment of a committee to investigate the question of the licensing of engineers and, subject to the approval of the Association, to draft a licensing law. The two questions, licensing, and the general status of the profession, are interdependent and a discussion of one involves discussion of the other.

While the licensing of engineers has been under discussion for a long time, none of the measures that have been proposed have been satisfactory to the interests involved, and the few laws that have been passed have either been ineffective, like the Surveyors' Licensing Law in California, or else productive of bad results, like the Structural Engineers' Licensing Law in Illinois. Under such circumstances, it would require a prophet or at least the son of a prophet to predict just what form licensing will take, provided it finally comes. However, a few definite statements, and a number of conjectures may be made regarding what licensing will or will not be, and what it will or will not do.

First of all, licensing will not eliminate the quack engineer, any more than it has the quack doctor or the quack lawyer. However, it seems probable that a licensing law could be prepared that would reduce the total number of quack engineers.

Next in importance is the field that a licensing bill would cover. Here is one place where the licensing question involves the general question of the status of engineers, since a definition of an engineer is required. It is a trite statement that the general public does not know what an engineer is. Besides the man that runs an engine, who should be called an engineman, as he is in some countries, there is the plumber that calls himself a sanitary engineer, the general freak that calls himself an efficiency engineer, and many others. The real trouble, however, is in distinguishing between the so-called professional engineer, the commercial engineer, and the contractor. As long as the commercial engineer

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

confines himself to selling engineering equipment, licensing laws would not affect him. If, however, he designs the engineering structure of which such equipment is a part, he would undoubtedly be considered as practising engineering. One of the results that is expected from a licensing law is to draw the line more clearly between the sale of equipment and the design of an engineering structure. Again the contractor on a thousand-yard grading job, while he may be a better engineer than many others of greater pretensions, obviously would not be affected by a licensing law, but the firm that designs and builds an important structure would be affected.

The recent discussion was at a meeting of civil engineers, and in general civil engineers have been more concerned with the question than other engineers. However, it would be difficult to frame a definition of civil engineering strict enough to exclude mechanical, electrical, mining, and chemical engineering. Originally civil engineering included all branches except military engineering. Just now, military engineering has swallowed all branches, but that, we hope, is a passing phase. The constitution of the American Society of Civil Engineers makes no attempt at a definition that is exclusive, but admits to the Society those practising other branches than civil engineering. A licensing law that did not apply to all branches of engineering would probably prove unsatisfactory. A few more classes of certificates would be required under a general law, but the additional number is relatively unimportant when the number required for the various branches of civil engineering alone is considered.

This specialization in the various branches of civil engineering presents one of the greatest difficulties in framing a satisfactory licensing law. An association of civil engineers in Colorado once investigated this subject, and decided that 25 classes of licenses would be required. A prominent structural engineer of San Francisco recently stated that he invariably referred all hydraulic work to other engineers, and had even become so 'rusty' on this part of his college training that he could not make a weir-measurement and compute the discharge of a stream without referring to a text-book. Probably some hydraulic engineers would say the same thing about some simple structural problem. The result of this specialization would be that the average engineer in private practice would have to obtain several different certificates. This would involve a great deal of trouble, but it might be worth while if some of the benefits expected from a licensing law actually come to pass. What is perhaps more important than the trouble for engineers and others is the fact that the general public, which does not know what an engineer is, is even more ignorant regarding what a hydraulic or a structural engineer is. Whatever commission had charge of the enforcement of a general licensing law would have its hands full keeping track of all the construction work in the State to make sure that, say, a man with only a sanitary engineer's certificate did not break loose and take a highway job.

Again, assuming that a licensing law is passed, should its provisions be confined to engineers in private practice, or should they be more inclusive? A State law could hardly be drawn so as to affect engineers in the Federal service, and to apply it to State employees would amount simply to a duplication of examinations. Probably no government employee, Federal, State, county, or municipal, would be affected as long as he did no private work. Furthermore, men in subordinate positions not requiring the exercise of individual judgment would naturally not be subject to the provisions of the law, no matter where they might be employed. The principal question in framing this part of the law would be to determine who among the engineers holding responsible positions in the employ of corporations should be required to hold licenses. In this connection it should be pointed out that most engineers, whatever their present employment, would find it convenient to obtain licenses, in order to be prepared for the future.

How shall a man's abilities as an engineer be determined? The California Surveyors' Licensing Law, already mentioned, does not provide for an examination, but requires the signatures of three licensed surveyors attesting that the applicant is a competent surveyor and of three orther persons that he is of good moral character. Unfortunately, some men will sign almost any paper that is handed to them, and the courts are full of litigation resulting from the mistakes of men holding surveyor's licenses. Some real examination is needed. However, it should not be the oldstyle civil service examination. Ability in engineering is dependent more upon mature judgment than upon the answering of catch questions. We have already discussed in these columns the present practice of the California Civil Service Commission in filling the more important engineering positions in the service of the State. A preliminary written examination is given to test the applicant's grasp of fundamentals. Applicants obtaining a satisfactory rating qualify for the second part of the examination, which consists of a personal interview with a committee of prominent engineers. The applicants are graded by this committee. We believe that this method, or something similar, could be used to advantage if a licensing bill is passed.

In view of the fact that a licensing law does not seem to be very attractive after all, it may be asked why does not the profession simply continue to oppose all licensing bills, as it has done in the past? The occurrences a year ago at Sacramento ought to be a sufficient answer to this question. Few engineers realize how near the Architects' Licensing Bill came to becoming a law, or how persistent are the interests back of that bill, one of the worst licensing bills ever presented before a legislature. This bill, or something equally bad, is going to be introduced at the 1919 session of the California legislature, and if it passes, a movement will be started in other Western States. The average legislator can see nothing but a sinister motive in the objections of the engineering profession to all licensing. As a last resort, the only effective way to fight a bad licensing bill may be to offer a relatively good bill as a substitute.

Generated on 2024-09-30 01:38 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
UNIVERSITY OF ILLINOIS AT
URBANA-CHAMPAIGN

REVIEW OF THE MONTH

PROGRESS in food-conservation is shown by the complaints of garbage contractors all over the country that their contracts have become unprofitable. The latest instance is the Sanitary Reduction Works of San Francisco, which has notified the city of its desire to terminate the present agreement, which is no longer profitable to the company. The garbage-plant will be turned over to the city, which has nearly completed paying for it.

SO much discussion and misconstruction has followed Secretary McAdoo's recommendations concerning general construction work that it seems advisable to print them in full. They were as follows: "Because of the interest of the Treasury Department in the conservation of capital and credit during the period of the War, I have received several inquiries as to whether building operations of one kind and another should be discouraged. With regard to plans for public buildings under the control of this department, I have stopped letting contracts except in cases where they were absolutely necessary. Home building is an excellent thing in normal times, but at present, unless there is a real shortage of houses for war workers, I strongly advise that materials, valuable labor, and credit be not utilized for this purpose. Whether homes should be built should be determined strictly by the urgency of the need."

THE legal status of the cost-plus-percentage contract as applied to public work in California is to be determined. The Board of Supervisors of Sonoma county, finding last fall that the uncertainties of the labor and material situation tended to prevent contractors from bidding on highway work, let several contracts on a cost-plus-percentage basis. There has been some doubt regarding the legal authority of the Board to take such action, and on the advice of Mr. U. S. Webb, State Attorney-General, the question is to be made the subject of a friendly suit. Whatever may be the advantages of competitive lump-sum or unit-price bidding in ordinary times, it certainly throws a great deal of risk on the contractor in times like the present. This risk the public must expect to pay in one form or another, and the result is likely to be that the cost under the ordinary system is greater than it would be under a 'cost-plus' contract. If the right of public officials to enter into such contracts is definitely established, it is probable that much public work will be done in that way.

A COUNTY fire department is to be established in Napa county, California, at the suggestion of the County Council of Defense. The rural part of the county has been divided into 18 districts, each of which is to have a volunteer fire-fighting force of 12 men, including a captain. These companies are to have regular drills and will have some simple fire-fighting apparatus, which can be loaded on a trailer drawn by an automobile.

THE need of fire-prevention as well as fire-protection is shown in a report issued recently by the National Board of Fire Underwriters. Statistics covering over 97% of the fires in the United States during 1916 show a total loss of $208,705,340. Of this amount, preventable causes, such as defective flues, sparks on roofs of inflammable materials, matches, etc., were responsible for $60,466,054; partly preventable causes, such as spontaneous combustion, explosions, etc., were responsible for $99,606,293, while a loss of $48,632,993 is classified as being the result of unknown causes. A large number of these fires from unknown causes were undoubtedly preventable. The total loss was $2.10 per capita for the entire country, which is from 7 to 20 times the usual loss in European countries. In these days when the number of incendiary fires is increasing, and when all forms of waste are particularly criminal, it is important that every possible protection against fire be observed.

A PARTICULARLY foolish bill to hamper the oil-refining industry has been proposed in the House of Representatives. It prohibits the sale in interstate commerce of gasoline testing below 62° Baumé at 70° Fahrenheit. The absurdity of such a regulation will be apparent when it is remembered that the only way to ensure that there will be enough gasoline to go around is to educate the public to use the lower gravities. Any legislative interference in this matter is inadvisable, but if Congress cannot keep its hands off the refining industry, let it enact a law that no gasoline lighter than, say, 56° Baumé shall be sold in interstate commerce.

THE Federal government has asked for a supply of 8000 barrels of gasoline per day for aviation engines. Specifications call for a gravity of 62° Baumé, 65% to distill at 212°, 87.5% at 240°, and 100% at 302° Fahrenheit. This is a high-gravity product, according to present standards. In order to supply it, the refiners will have left a considerable amount of low-gravity distillates, which emphasizes the importance of educating the general public in the use of low-gravity fuels. The price offered for the 'aviation gasoline' is 32 cents per gallon, f.o.b., tank-steamer at Marcus Hook, near Philadelphia. This is said to be enough to give a reasonable profit to both Eastern and Middle Western

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

refiners. Californian refiners, of course, will not be able to compete for Atlantic Coast deliveries, but will probably furnish whatever gasoline is used at Western training-fields.

DEALERS in fuel-oil whose gross sales exceed 100,000 barrels must obtain licenses from the Federal Fuel Administration. This does not affect dealers in gasoline, kerosene, and other refined products, except indirectly. So far, this is the only regulation announced since the appointment of Mr. M. L. Requa as Federal Oil Administrator. Mr. Requa has issued a general statement in which he disclaims even the desire to fix prices, or to restrict the producers of petroleum in any way that may be avoided. He appears to recognize that the oil producers and refiners have thus far met all demands upon them, in spite of many difficulties, and that the principal work of the Fuel Administration will be to encourage production and to assist the producers in obtaining the necessary material. The appointment of Mr. T. A. O'Donnell as head of the production department is a particularly fortunate one, since he understands the needs and the troubles of the producer as well as anyone that could have been selected. Mr. D. M. Folsom, who has been placed in charge of the division that comprises the States west of the Rocky Mountains, including Alaska and the Hawaiian Islands, is also a fortunate selection. His recent work as a member of the committee of the California State Council of Defense that reported on the Californian petroleum situation is well known. The minor appointees that have thus far been announced are also men well qualified for the work that they will have to do.

THE spirit of co-operation existing between the officials of the California State Mining Bureau and the oil operators of the State has already been mentioned in these columns. Further evidence was afforded at a recent conference between the State officials and representatives of companies owning nearly half the proved oil-land in the State, held in San Francisco at the office of Mr. Fletcher Hamilton, State Mineralogist. A similar conference is to take place in Los Angeles on March 11. At the San Francisco meeting, Mr. R. P. McLaughlin, State Oil and Gas Supervisor, stated that all but one of the companies operating in California and producing more than 1,000,000 barrels per year have announced their intention of adopting plans that make use of the most recent developments of engineering knowledge. Many of the smaller companies have followed their example, and the general adoption of such methods is likely to be a matter of a short time. The direct practical results of some of the investigations undertaken by the State Mining Bureau have contributed largely to this change from the old attitude, which regarded the 'mud-smeller' with suspicion. In this connection, however, it should be remembered that the State cannot undertake the management and repair of all private properties, which work must in general be done by the individual companies. Besides its efforts in combatting water-infiltration, the Bureau's activities cover other lines where its work is of a more advisory nature, such as the investigation of the use of mud-laden fluid in drilling. If this method, which has been successful in Oklahoma, can be adapted to Californian conditions, a considerable saving of casing will be possible. This is particularly important at the present time, since the suply of casing is not, and probably will not for some time to come, be equal to the demand.

MUNICIPAL bond-issues exceeding $100,000 in amount must have the sanction of the Capital Issues Committee of the Federal Reserve Board before being offered to the public. A full statement of the purposes and circumstances surrounding each issue must be furnished with each application. This is particularly required if funds are needed for extensions or improvements relating directly to production of war material. In all cases, the reasons why the proposed issues should not be postponed until after the War must be given in full. These regulations apply to State, county, and other public issues as well. The Committee is working with the Office of Public Roads and Rural Engineering to determine a highway-construction program for the coming season. In general, as has been already announced, highway construction is not to be greatly curtailed, but is to be confined to the completion of unfinished links in important trunk-line routes, and the construction of other highways that will facilitate the movement of agricultural products to large cities. Projects for highways that cannot be completed and giving actual results inside of one year are not likely to receive favorable consideration. This general principle is to be applied to all classes of construction. If followed strictly, this will have a particularly discouraging effect on irrigation development. Projects where the land is wholly or largely uncultivated can hardly be constructed at all, since the chances of farming the land profitably for the first year, even on an extensive scale, would necessarily be small. Such a project as the Pine Flat dam in the San Joaquin valley would also be ruled out. Most of the land in this project is under cultivation, and in fact under irrigation at the present time, and the dam is to be built to stabilize the water supply and to increase the length of the water season, as well as to provide water for some land not now irrigated. But the size of the dam is such that it would take a year or more to construct it, and considerably longer than that before any material effect on the food supply of the country would be felt. Apparently, the only irrigation work possible under the new restrictions will be relatively small extensions and improvements of existing systems, of such a character that they can be completed in time to increase the crop-yield during the coming season. The Committee is evidently proceeding on the assumption that the War will be over within a year, and we all hope that this is true, but such an assumption seems like taking a rather long chance.

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

DISCUSSION

In Camp

The Editor:

Sir—Arrived here on schedule time Monday morning, the 7th, about 10 a.m., and by noon I had been assigned to quarters and established my belongings. At 1 p.m. I fell-in with the rest of the recruits and was marched out to the drilling-grounds where I spent the rest of the afternoon doing squads right and squads left, so you see when they once get you here it does not take them long to get you busy.

THE DAY. Get up at 6:15, answer reveille at 6:30 a.m., which is followed by breakfast. 7:30 a.m. we fall-in and are marched to the drilling-grounds, where we are instructed in drilling and are put through setting up exercises and back to our barracks by 11 a.m. From 11 to 12 a.m. clean-up for dinner. Dinner from 12 to 1:30 p.m. At 1:30 p.m. we fall-in again and are marched to the drilling-ground, where we get more drilling and finish up with a hike of from 4 to 6 miles. We are back to the barracks by 4 p.m. From 4 until 5:30 p.m. clean-up for supper. At 5:30 p.m. we stand retreat. At 6. p.m. we march to supper. After supper we are allowed to go any place we want to within the lines (providing your regiment is not quarantined, which is our case now. The 27th has been quarantined since the first part of December, but they expect to lift the quarantine in about 10 days) until 9:45 p.m. and at 10 p.m. we are supposed to be in bed so as to be in shape for the morrow.

THE BARRACKS in which we are living are two-story wooden buildings about 80 ft. long, 35 ft. wide, and 10-ft. ceilings. There are about 35 half-size iron beds on each floor, on which we have a straw mattress and four Army blankets. The first night I spent most of the time trying to keep myself covered up, but it doesn't take long before you learn to lie quiet. There are plenty of windows, but the nights have been pretty cold, so the men would rather have them shut; however, we have had ours open above our beds and have managed to keep from freezing up. In the centre of each floor is a large stove that burns hard coal when we have it, otherwise green wood. This camp-site was covered with small trees, so there is plenty of wood.

MESS-HALL.. One-story wooden building about 125 ft. long, 25 ft. wide, and 10-ft. ceiling. Each mess-hall is supposed to accommodate one company, or 250. They have done away with individual mess-kits during this cold weather, and instead everything is placed on the tables in very much the same manner as a mine boarding-house is run. At present we have about 400 men in this regiment, and only one mess-hall, so that it makes things bad. After the first bunch of men have been fed, 150 plates, cups, knives, forks, and spoons have to be washed before the second bunch can come in to eat. That is not the worst feature, however, as the stove they have is only large enough to take care of 250 men, so, in order to take care of 400, all side-dishes have to be cut out. The men are complaining of the food they are handing out, and they often have good cause, because the food runs out before the second table gets all they want. This, however, will be remedied when we move to new quarters, which will probably be this week. As long as one has money he need not go hungry, as one can buy most anything you want at the exchanges. Exchanges are small stores run by different regiments and the proceeds of which go to the mess-hall for extra good things to eat. The 27th so far has no exchange.

THE MEN. As one would expect, we sure have a Duke's Mixture here. In one bed lies a tough Butte miner and probably in the next a Gen. Mgr. The last three days have brought in a mighty fine bunch of men. They all look like men of means and ability. The quarantine was too much for some of the miners, so New Year's day eleven got through the lines and went to Baltimore for a big time, and I guess they had it. They didn't come back for a week, and, of course, when they did they were court-martialed and sentenced to four months at hard labor with half-pay. So now we do not have to chop our own wood any more. One would think that a sentence like that would make a man feel just a little blue, but not for those boys, they are the happiest lot in camp.

K. P. means Kitchen Police, it means waiter and dish-washer. Each day 7 men are assigned to K. P. duty. Last Friday was my first. You go on duty at 6:30 a.m. and if you work good and fast you can get through by 7:30 p.m. The 7 men are divided as follows: Four are assigned to wait on tables and wash all dishes, two are assigned to the kitchen to wash all pots and kettles, and the seventh is assigned to chop wood for the kitchen-stove. That was my job, but on account of the prisoners chopping all the wood, I scrubbed out the refrigerator from stem to stern and helped to cut up the beef. This is the kind of duty that makes the boys wonder why they left home. This is the remark that I hear 50 times a day: "If I ever get out of this, they will never get me again"; however, some of the boys who made this remark a few days ago are gradually changing their mind, as they see that all these things are necessary for success.

I was very much surprised to arrive here and only find 350 men in the Regiment, but I understand that Major Perry is in Arizona now getting recruits.

Am feeling fine and in the best of health.

Remember we are always glad to gets news from Home.

ED.

Camp Meade, January 13.

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Methods of Construction of Pier No. 3, San Francisco Harbor

Pier No. 3 is a reinforced concrete structure situated about 600 ft. from the Ferry building. The work now practically completed comprises the removal of the old pier No. 5, a pile structure, and the construction of the main pier 138 by 706 ft. long, a bulkhead-wall, 45 by 423 ft., and a small passenger pier, 76 ft. wide and 98 ft. long. The open space between the passenger pier and the main pier is 61 ft. wide. Ultimately, another pier, to be called No. 1, will be constructed south of pier No. 3, between it and the Ferry building. The two large piers and the passenger pier between them are to be used by the California Navigation & Improvement Co. and the California Transportation Co., which operate steamers on the Sacramento and San Joaquin rivers. Steamers docked alongside either of the large piers will be able to discharge passengers to the passenger pier, without interfering with the discharge of freight to the main pier. There will be room for two river-steamers to lie alongside either of the large piers and discharge freight.

Contract for the work was awarded in January 1917 to J. D. Hannah, at $248,000. This amount does not include the cost of cement and creosoted piles, which were furnished by the State Board of Harbor Commissioners. The plans show an average distance of about 30 ft. from the floor of the pier to the 'mud-line' and about 50 ft. to the 'stiff-mud' line. Reinforced concrete piles in the bulkhead-wall range from 16 by 16 in. by 40 ft. to 18 by 18 in. by 70 ft. There are about 190 in all. The spacing varies slightly, but the average is 10 ft. centre to centre parallel to the length of the wall, and 14 ft. centre to centre, perpendicular to the length of the wall. There are about 40 piles in the passenger-pier, most of them 20 by 20 in. by 95 ft. The average spacing is 11 ft. centre to centre parallel to the length of the wall, and 15 ft. centre to centre perpendicular to it. The piles in the main pier are 20 by 20 in., and range from 90 to 105 ft. long. There are nearly 1000 of these. The average spacing is 10 ft. centre to centre. The average thickness of floor-slab on the main pier is 5 inches.

The specifications provide for a mixture of one part cement to five parts of aggregate for the piles, and one part cement to six parts aggregate for the beams, floor-slabs, girders, and bulkhead-wall. The proportions between the sand and crushed rock were varied to give the maximum density. Concrete was sprinkled twice a day for two weeks after placing. Special care was taken to avoid the formation of voids and stone-pockets. When voids, stone-pockets, or poor joints between the tops of piles and the floor-beams were found after the forms were removed, these defective places were cleaned to the solid concrete and filled with mortar. Reinforced concrete piles were not driven until at least 45 days after casting.

The fender-piles were of creosoted timber. These piles were sheathed with untreated timber to protect them from damage caused by collision with vessels. They were treated with at least 12 lb. of creosote per cubic foot. The penetration of the heavier black oil extended at least 1 in. from the surface at all points.

For the concrete, Pacific portland cement, Rio Vista and Napa gravel, and blue trap-rock from Blake Bros. quarry were used. A ½-yd. Ransome mixer was used, a crew of 8 to 20 men being employed at the mixer, depending on the demands of the work. For driving the piles, two float-drivers and one top-driver were used. For the actual driving of the piles, a float-driver equipped with a No. 0 Vulcan hammer, and having a crew composed of one foreman, two engineers, and eight pile-men, was used. The other float-driver was used to load piles on a barge at the pile-yard, from which they were towed to position. This driver had a crew of one foreman, one engineer, and eight laborers. A stiff-leg derrick was also used to help load the piles at the yard. The derrick-crew was composed of one foreman, one engineer, and one pile-man.

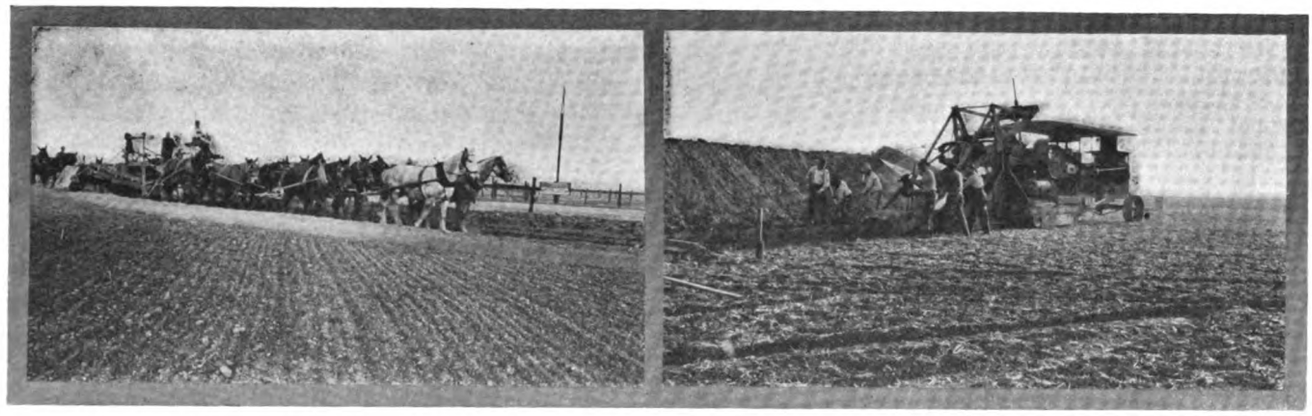
Contract for construction of frame-and-plaster buildings on the main pier, passenger-pier, and bulkhead-wall was also awarded to J. D. Hannah for $103,314. The main pier-shed will cover the entire pier, except for a space 20 ft. extending along the north side of the pier for a railroad track. The shed will be 29 ft. high with a clear height of 19 ft. in the centre of the shed. Two lines of interior wooden columns, most of them 10 by 12 in. and 10 by 14 in., will extend for the entire length. The roof will be supported by trusses in the centre and girders on each side. In general, the truss-span is 41 ft. 2 in. and the girder-spans, 34 ft. 6 in. each. These sets of one truss and two girders are spaced 30 ft. centre to centre. The main truss members are 6 by 10 in., with ¾-in. tension-rods. In general, the girders are either 10 by 18 in. or 10 by 22 in. A passenger-gallery 8 ft. wide, with the floor 14 ft. above the floor of the shed will extend along the south side of the shed.

The passenger-pier building is a one-story structure 66 by 68 ft. The bulkhead-building is a two-story structure 32 ft. high, 30 ft. wide, and extending along the entire length of the bulkhead-wall. It will contain offices and waiting-rooms.

This work is being done for the State Board of Harbor Commissioners under the general direction of Frank G. White, chief engineer.

The longest-lived rope-drive in 24-hour service is in a Lancashire cotton-mill. The drive was fitted in 1878 and transmits 820 hp. at 4400 ft. per minute.

Generated on 2024-09-30 01:38 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



HORSE-DRAWN EXCAVATOR DIGGING CANALS AND TRACTION EXCAVATOR DIGGING PIPE-TRENCH

The West Side Irrigation District*

The West Side irrigation district comprises about 11,500 acres of land in the vicinity of Tracy, California. It is on the west side of the San Joaquin valley, about 75 miles east of San Francisco. The slope of the land varies between 15 and 50 ft. to the mile. The land has been cultivated for about fifty years, hay and grain being the principal crops, but the rainfall is scanty and variable, ranging from 5 to 20 in. per year, so that occasional crop-failures occur. None of the land within the district has been irrigated. There are no streams from which a gravity supply could be obtained nor are the ground-water supplies sufficient for irrigation. The only practicable source of irrigation water is by pumping from the San Joaquin river.

Early in 1915 a temporary organization was formed among some of the land-owners in the locality, looking toward the formation of an irrigation district, and W. G. Hunter, of Stockton, was retained to report on the project. In April 1915, Mr. Hunter recommended the building of a system, substantially the same as the one now under construction, consisting of an intake-canal extending from Old river, a channel of the San Joaquin river, to a pumping plant near Bethany on the Southern Pacific railroad, two pressure pipe-lines, part reinforced concrete and part wood-stave, one line about 4000 ft. and the other about 9000 ft. long, each supplying a main canal, together with laterals and minor structures. The estimated cost of this system was $285,000, based on prices prevailing at that time.

Studies were made of several alternative systems besides the one adopted. No detailed investigation was needed to show that systems comprising one pumping plant and more than two pipe-lines and canals would have both a higher first cost and a higher annual cost than the system chosen, while there would be no compensating advantages. A two-plant, two-canal, and single pipe-line system would have a slightly higher first cost and considerably higher annual cost than the system chosen, the latter because of the additional number of employees required. A three-plant, three-canal, and single pipe-line system and a five-plant, five-canal, and single pipe-line system would both have been considerably more expensive than the system chosen, and, in addition, would have cut the land into inconvenient shapes with the extra number of contour-canals. Only two systems besides the one chosen were sufficiently attractive to require detailed study.

A system composed of one pumping plant, two pipe-lines, and three main canals would have cost $25,000 more than the one chosen. The annual cost of power would have been $0.87 per acre for one acre-foot pumped, $1.74 for two acre-feet, and $2.61 for three acre-feet. The interest, depreciation, canal-maintenance, and canal-attendance would all have been more than for the system chosen, making the total annual cost greater. In addition there would have been one more contour-canal, cutting the land into inconvenient shapes. Worst of all, only two canals could have been supplied at a time, because of there being but two pipe-lines.

Studies were also made of a system similar to those in operation at Patterson and Brentwood, and consisting of four pumping plants, four main canals, and a pipe-line. The estimated cost of this system was as follows:

Intake canal		$32,000
Pumping plant No. 1:		
Building and sump	$18,000	
Pumps	5,250	
Motors	5,375	
Valves, piping, and screens	2,050	
Erection of machinery	2,000	
		32,675
Pumping plant No. 2:		
Building	$8,500	
Lined basin	2,200	
Pumps	3,450	

*From data furnished by W. G. Hunter, Stockton, California.

Generated on 2024-09-30 01:36 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Motors	1,700	
Valves, pipes, etc.	1,400	
Erection of machinery	1,650	
		18,900
Pumping plant No. 3:		
Building	$6,000	
Lined basin	1,000	
Pumps	1,920	
Motors	1,000	
Valves and pipes	860	
Erection of machinery	1,100	
		12,880
Pumping plant No. 4:		
Building	$6,000	
Lined basin	500	
Pumps	1,440	
Motors	750	
Valves and pipes	640	
Erection of machinery	1,000	
		10,330
Concrete pipe:		
600 ft. of 72-in. pipe with taper	$9,000	
950 ft. of 54-in. pipe with taper	8,125	
850 ft. of 42-in. pipe with taper	5,425	
750 ft. of 36-in. pipe with taper	3,975	
Railroad culvert	2,500	
		29,025
Wood pipe:		
2850 ft. of 72-in. pipe		21,735
Canals between plants:		
Plants No. 1 and No. 2	$2,400	
Plants No. 2 and No. 3	2,050	
Plants No. 3 and No. 4	2,050	
Plants No. 4 and boundary	1,000	
		7,500
Excavation of canals (33.8 miles of main canals and waste-canals, 15.8 miles of laterals), 345,000 cu. yd.		44,800
Structures:		
Railroad crossings	$9,000	
Highway crossings	17,600	
Bridges	9,500	
Stop-gates	1,800	
Check-gates	900	
Lateral-gates	4,920	
Drops	6,000	
		49,720
Right-of-way		10,000
General expense:		
Structures over pipes and main canal	$3,000	
Right-of-way for pumping-plants and pipe-lines	3,500	
Fences	5,500	
Telephone system	4,500	
Power line	5,000	
Engineering, legal, and administrative	27,000	
		48,500
Total		$317,705

This is $32,705 more than the estimated cost of the recommended system.

While the power-cost would be slightly lower for the four-plant system than for the one adopted, the other items in the annual cost would have made the annual cost higher for the four-plant system. In addition, there are the disadvantages of the four-plant system resulting from the four main canals cutting the land into inconvenient shapes and from the additional seepage from four canals instead of two.

The detailed estimate for the system chosen was as follows:

Intake canal		
Excavation (222,600 cu. yd. at $0.11)	$24,486	
Bridges	4,000	
Right-of-way	3,514	
		32,000
Pumping plant:		
Building (inclusive of sump, foundations for machinery, incidental equipment, and station-grounds)	18,000	
Pumping machinery	24,500	
		42,500
Pipe-lines:		
Concrete pipe	9,000	
Wood-stave pipe	66,800	
Railroad crossing	4,500	
Wooden bridges	2,160	
Concrete highway-bridge	600	
Right-of-way	2,700	
		85,800
Canal excavation, 265,000 cu. yd. at $0.13		34,450
Structures:		
Railroad crossings	7,000	
Highway crossings	16,800	
Farmers' bridges	7,500	
Stop-gates	1,200	
Check-gates	900	
Lateral-gates	4,920	
Drops	10,500	
Fences	4,500	
Telephone lines	3,500	
Lining canals, where required	1,600	
		58,420
Right-of-way		6,830
Engineering, legal, and administrative expenses		25,000
Total		$285,000

On a basis of 11,500 acres in the district, the cost per acre would be $24.78. The probable annual cost was computed as follows:

Bond interest was assumed at 6%, the bonds to be issued for 40 years, and the principal to be paid during the last 20 years of that period, thus giving ample time for the farmers of the district to establish themselves before paying the principal. On this basis the annual interest charge for the first 20 years would be $17,100 or $1.48 per acre. The charge for the second 20 years would be $24,847 or $2.17 per acre. Depreciation was figured at 5% per year on the wood-stave pipe, 2% per year for the concrete structures, and 3% per year for the rest of the system. The total yearly depreciation was computed to be $8120, or $0.706 per acre. Ditch-tending and canal maintenance was assumed at $0.50 per acre per year after all the district is using water, and $0.35 per acre per year during the first five years. Attendance at the pumping plant was figured on the basis of one engineer and one helper for the entire year and two additional engineers and one additional helper during the six months of the irrigation season. The attendance charge would be $4350 per year, or $0.378 per acre. Assuming the cost of power as ¾c. per kilowatt-hour and the over-all efficiency of the pumping plant as 67.5%, the charge for power

Generated on 2024-09-30 01:38 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

would be $0.96 per acre-foot. Of the total area of the district, 10% will probably never be irrigated on account of roads, buildings, farm-yards, etc. A 25% allowance for canal losses should be made. Two acre-feet per acre per season will be needed for the land irrigated. For the first five years the average area under irrigation will probably be about 5000 acres, and the total charge for power will be about $1 per acre per year. Later, when all the irrigable land is using water, the cost will be about $2 per acre. For the first five years the probable annual cost per acre would be as follows:

Bond interest	$1.48
Canal attendance and maintenance	0.35
Pumping-plant attendance	0.38
Power	1.00
Total, exclusive of depreciation	$3.21
Depreciation	0.70
Total	$3.91

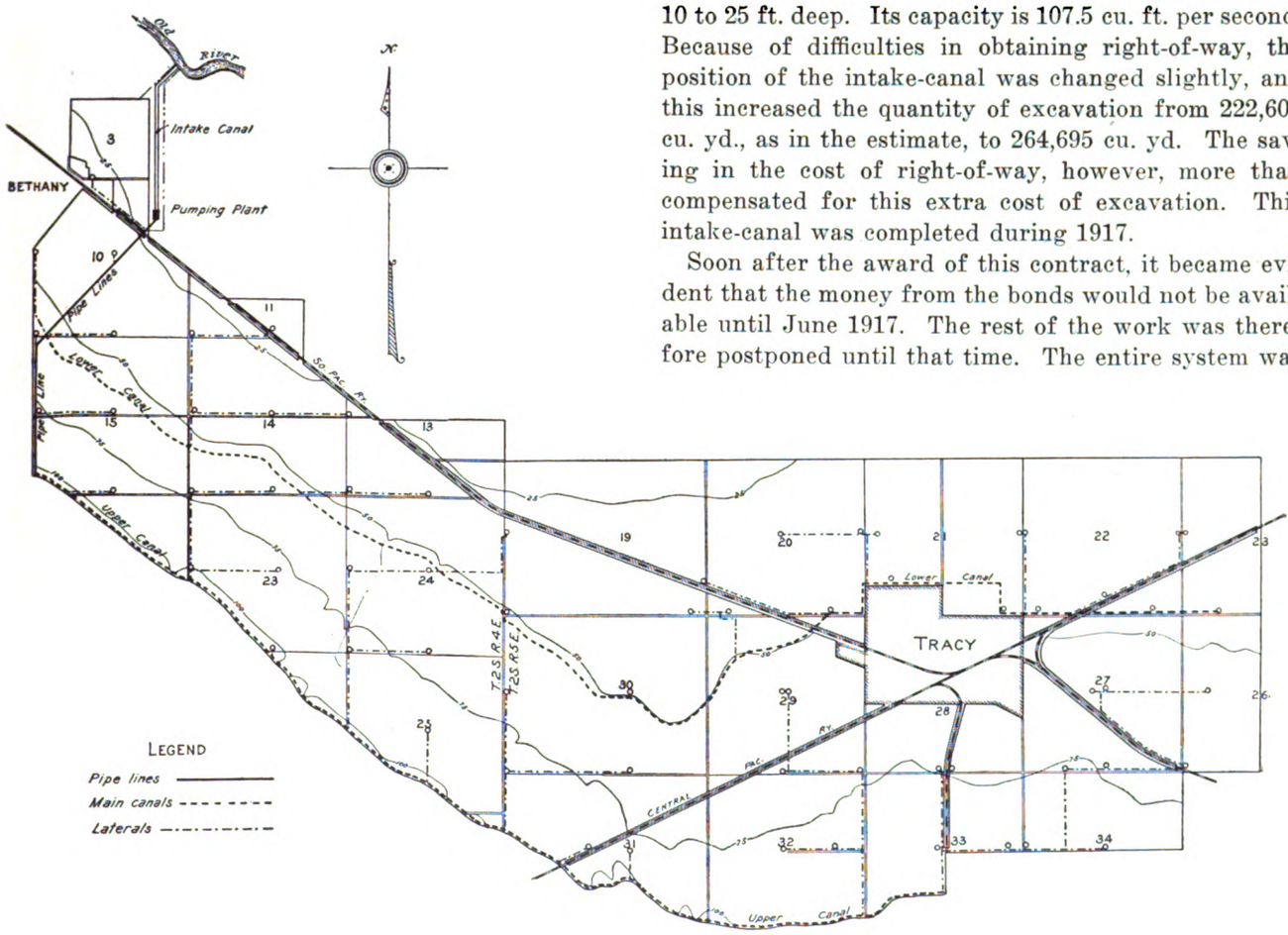
For the next 15 years, the probable annual cost, including depreciation, would be $5.06 per acre. For the next 20 years, the probable annual cost will be $5.75 per acre. Should three acre-feet per acre be required during this period, the cost of power will be increased proportionally, and the total probable cost will be $6.75 per acre.

The district was formed in October 1915, and Mr. Hunter was retained as chief engineer for the district. In May 1916, he reported in favor of the construction of an irrigation system, substantially as outlined above, and this report was approved by C. E. Grunsky, as consulting engineer. The report, together with plans and estimates, was filed with State engineer W. F. McClure on June 10, and on June 26, the plans were approved by him. Because of legal technicalities, the bonds were not voted until November 1916. Similar technicalities delayed the sale of the bonds until June 1917. They were then sold, $270,000 to the City Bank of Stockton at 103.12 and $25,000 to the Bank of Tracy at 103.25. This unavoidable delay of a whole year, bringing, as it did, the period of construction into war times, was an expensive one for the district, both on account of the higher prices and of the delay in obtaining water.

The position of the intake-canal and pumping plant was determined by the fact that the slope of the land is considerably greater at that end of the district than at any other point, giving a minimum length for both the intake-canal and the pipe-lines.

For various reasons it was advisable to construct the intake-canal as early as possible, and a contract for this work was awarded in December 1916 to the Antioch Dredging Co. of San Francisco for $0.084 per cubic yard, or $0.026 less than the preliminary estimate. This intake-canal is 25 ft. wide on the bottom and from 10 to 25 ft. deep. Its capacity is 107.5 cu. ft. per second. Because of difficulties in obtaining right-of-way, the position of the intake-canal was changed slightly, and this increased the quantity of excavation from 222,600 cu. yd., as in the estimate, to 264,695 cu. yd. The saving in the cost of right-of-way, however, more than compensated for this extra cost of excavation. This intake-canal was completed during 1917.

Soon after the award of this contract, it became evident that the money from the bonds would not be available until June 1917. The rest of the work was therefore postponed until that time. The entire system was



MAP OF DISTRICT

Generated on 2024-09-30 01:39 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

divided into 13 contracts. Contract No. 1 covered the intake-canal. Contract No. 2 is for furnishing power. Contract No. 3 is for furnishing the pumping machinery. Contract No. 4 is for the construction of the wood-stave pipe-lines. Contract No. 5 is for the construction of the upper main canal. Contract No. 6 is for the lower main canal. Contract No. 7 is for the lateral canals. Contract No. 8 is for a wooden highway-bridge across the intake-canal. Contract No. 9 is for the pumping-plant building. Contract No. 10 is for the reinforced concrete pipe. Contract No. 11 is for the reinforced concrete and corrugated-iron highway crossings. Contract No. 12 is for drops, gates, and other structures in the laterals. Contract No. 13 is for railroad crossings.

Contract No. 2 for furnishing power was awarded to the Sierra & San Francisco Power Co. at rates ranging from 0.55c. to 0.75c. per kilowatt-hour.

Contract No. 9 for the construction of pumping-plant building was awarded to the Lindgren Co., of San Francisco, for $25,789. This building is now under construction. It will be a concrete and reinforced concrete structure 23 by 93 ft. long. The floor-level will be at an elevation of 16 ft. above sea-level, U. S. Geological Survey datum. The water from the intake-canal enters a concrete-lined sump, having a bottom elevation of minus 7.5 ft. In anticipation of possible increase in the demand for water, foundations are provided for nine pumps and motors although only seven are to be used at present.

Contract No. 3, for furnishing the machinery for the pumping plant was awarded to the Electric & Machine Equipment Co., of Stockton, for $56,718. The principal items of this equipment are as follows: Seven 15-in. Byron Jackson centrifugal pumps, three to deliver not less than 15½ cu. ft. of water per second each against a head of 64 ft. and with a speed of 875 r.p.m., and the other four to deliver the same quantity of water against a head of 126 ft. and at a speed of 1160 r.p.m. The low-lift pumps to use not more than 175 hp. each and the high-lift pumps to use not more than 320 hp. Seven 2200-volt, 3-phase, 60-cycle Westinghouse motors, three to develop 200 hp. and the other four 325 hp. Three Westinghouse transformers and one General Electric Co. switchboard. Two Byron Jackson priming-pumps. This machinery will be delivered and placed during April.

Contract No. 10 is for constructing the two lines of reinforced concrete pipe from the pumping-plant building to a point near the Southern Pacific Co. tracks. One line 44 in. diam. is to receive the discharge from the three low-lift pumps, and the other line, whose diameter is 48 in., receives the discharge from the four high-lift pumps. The original intention had been to make these lines 48 in. and 54 in. diam., respectively, and the same with the wood-stave pipe-lines. On account of the increase in prices of materials and labor, however, it was decided, after comparing the saving in first cost for the smaller pipe with the increased annual cost for power, to use the smaller pipe. The pipe is to be made of 1:2:4 concrete, reinforced with twisted square bars. The pipe is to be laid in trenches six or seven feet deep. This pipe is now under construction. A 6-in. tile-drain is to be placed in each pipe-trench.

Contract No. 4, for furnishing, digging trenches for, and laying the wood-stave pipe-lines, was awarded to the Pacific Tank & Pipe Co., of San Francisco, for $79,300. There will be 3900 ft. of 44-in. pipe and 9250 ft. of 48-in. pipe. Laying this pipe is now under way. The trenches were excavated with an Austin trenching-machine. The depth varied from six to nine feet, and the width was sufficient to give working-room to the men laying the pipe. The soil was a rather light 'adobe' for about three feet on the surface and a sedimentary loam below that point. The cutters on the machine were three feet wide and the additional width was obtained by having men with long crowbars break off the material at the sides of the trench, the material falling and being caught on the cutters. About eight men were required back of the machine, using the crowbars, and also finishing the trench. The machine made about 100 ft. of trench per day on an average, being helped to some extent by the dryness of the soil during the construction period.

Contract No. 5, for the construction of the upper main canal, together with the necessary drain-boxes, was awarded to Johnson Bros., of Tracy, for $0.18 per cubic yard, or a total of approximately $20,810. This canal takes water from the 48-in. wood-stave pipe-line, the water being delivered to a concrete-lined forebay. The canal is built on a grade of one foot to the mile, and the total length is about 7.5 miles. The bottom width of the canal is 10 ft., depth about 4.3 ft., width of banks 4 ft., and slopes 1½ to 1. The upper side of the canal right-of-way is the boundary of the district. The canal will not be lined. The capacity is 70 cu. ft. per second. From this and from the lower main canal, laterals are constructed following the section and quarter-section lines, and bringing the water to the highest point of each 160-acre tract. The earth-work on this canal is nearly completed.

Contract No. 6, for the construction of the lower main canal, including the necessary drain-boxes, was awarded to C. H. Laiblin, of Manteca, at $0.18 per cubic yard, or $19,330 in all. This canal has a bottom width of 6 ft., average depth of 3.8 ft., width of banks 4 ft., and slopes 1½ to 1. This canal will not be lined. The capacity is 50 cu. ft. per second. The length of the canal is about 8.4 miles, and the grade one foot to the mile. The rough work on both this and the upper main canal was done with an excavator, and the canals were finished with plows and scrapers. The right-of-way for both canals is wide enough for a road and telephone line.

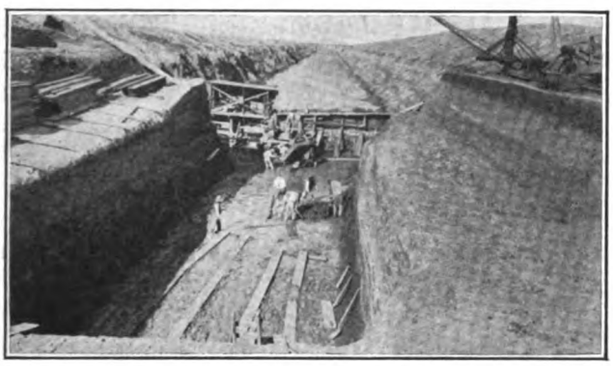
Contract No. 7, for the construction of the lateral canals and necessary drain-boxes, was awarded to Johnson Bros. at $0.18 per cubic yard, or a total of $14,900. The dimensions of the laterals are as follows:

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

bottom-width, 4 ft.; depth, 2.25 ft.; width of banks 4 ft.; side-slopes, 1½ to 1. The capacity is 30 cu. ft. per second. The total length of laterals is about 20 miles. As already noted, these laterals follow the section and quarter-section lines, thereby avoiding cutting the land into inconvenient shapes. The slope of the land is such that a number of drops are required.

Contract No. 8, for the construction of a highway-bridge across the intake-canal, was awarded to Jacobs & Sayles, of Stockton, for $2488. This is an ordinary wooden pile-trestle bridge composed of six 19-ft. spans, and having a 22-ft. roadway. This bridge has been completed.

Bids under contracts No. 11, 12, and 13 were received on February 26. At the time of going to press, no award had been made under these contracts. Contract No. 11 is for highway crossings, of which there are 22 in all. These crossings are reinforced concrete siphons of the type usually constructed on irrigation systems. Under the canal, there is a corrugated metal pipe on each side of the road for the road-drainage. The structures under contract No. 13, namely, the ten railroad crossings, are similar to the highway crossings.



INTAKE-CANAL AND PIT FOR PUMPING-PLANT BUILDING

Contract No. 12, for the lateral-drops, lateral-gates, and farmers' bridges, presents some unusual features. Since the laterals follow the property-lines, a large number of drops, about 70 in all are required. The original plans provided for concrete structures. The present plan is for a cheaper, but, it is believed, just as serviceable a structure. The drop consists of an earth fill across the canal, the same height as the canal-bank. Through this fill a corrugated metal pipe is placed, ranging in size from 18 to 30 in. diam., according to the amount of drop and quantity of water. Where a road is needed at that point, the fill is made 15 ft. wide on top. Where no road is required the fill is 4 ft. wide. The corresponding lengths of corrugated pipe are 30 ft. for a road and 18 ft. for no road. The places for the drop-structures have been chosen so that as far as possible, they can also be used for check-gates. A similar construction is used for the farmers' bridges and here also a drop and road-crossing can frequently be combined.

The original plans provided for a waste-canal to carry the waste-water into a channel called Tom Paine slough. This waste-canal will not be built at the present time, as it is believed that with careful management at the pumping plant, waste-water will be a negligible quantity. The canal may, however, be built later, particularly if arrangements can be made to sell waste-water to other land-owners.

As the work progressed, it became evident that the cost of constructing the system would be considerably more than the original bond issue. This was mainly because of the increase of prices since the original estimate was made. In this connection a study of the actual and estimated costs of the different parts of the system is of interest.

The estimate for the intake-canal, including the right-of-way and the highway-bridge was $32,000. Contract for this work, as already noted, was awarded several months before the rest of the system. The total cost will probably be about $34,000, the increase above the estimate being directly or indirectly the result of difficulty in obtaining right-of-way.

As might be expected, the pumping machinery showed the greatest increase of cost over the estimate. The total cost will be about $59,000, while the original estimate was $24,500. The cost of the building also shows a considerable increase, the contract price being $25,789, against $18,000 in the estimate.

Pipe-lines also proved to be more expensive than was expected, even though the sizes were decreased from one 54-in. and one 48-in. line to one 48-in. and one 44-in. The estimate for the wood-stave pipe was $69,300. The actual cost will be $80,150. The estimated cost of the reinforced concrete pipe was $16,500 and the actual cost will be about $26,000.

The cost of excavating the canals will be about $55,000, whereas the estimated cost was $34,450. This was partly because of increased quantity of excavation, but mainly because the actual unit price was $0.18 per cubic yard, while the estimated price was $0.13. Canal right-of-way was also more expensive than was anticipated. The original estimate was based on a uniform price of $50 per acre, which the directors of the district decided to raise to $100 per acre. This increased the cost of canal right-of-way from about $10,000 to about $20,000.

Of the remaining structures, the highway and railroad crossings will probably cost about the same as was estimated. There should be a considerable saving, probably about $3000, in the cost of the drops and farmers' bridges, on account of the change in plans mentioned above. Right-of-way for other parts of the system than the canals has cost more than was anticipated. It might be noted in this connection that the principal reason for increased cost of right-of-way has been the general increase of prices of land in the district since it was formed, which, in turn, is the direct result of the formation of the district. The increased cost of the work and the increased length of time required for its completion have caused an increase in engineer-

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ing, legal, and other general expenses. The increased cost of the system emphasizes the advantage of the system chosen over the four pumping-plant system, since the latter system required a large amount of machinery, and the greatest increase of cost was in machinery.

Taking these facts into consideration, a revised estimate was prepared of $392,823.27 for the cost of the system, or about $34 per acre. The original bond issue of $295,000 sold for $304,250, leaving $88,273.27 to be raised. To provide for contingencies, the Board of Directors of the district, at Mr. Hunter's suggestion, decided to make the additional bond issue $100,000, and called an election for February 19 to vote on the issuance of these bonds. This additional bond issue will increase the interest charges on the land in the district about $0.48 during the first 20 years and the interest and sinking-fund charges $0.64 during the next 20 years.

The distinctive features of the system are as follows: First, a single pumping plant delivering water to two canals at different elevations through two separate pipe-lines. Second, laterals following the property-lines, irrespective of the slope of the land, the necessary drops being provided by relatively inexpensive structures composed of an earth fill across the canal and a corrugated-metal pipe.

The construction of the system has been in charge of W. G. Hunter, of Stockton, chief engineer for the district, with C. E. Grunsky, of San Francisco, as consulting engineer. It is expected that the system will be ready to deliver water to the property-owners about May 15. The system has been planned so that additional land can be taken into the district and served with water at some future time. The most favorable direction for expansion of the district is to the east.

CAUSES OF FATALITIES IN RAILROAD ACCIDENTS

In 1916, 49% of the persons killed in railroad accidents were trespassers, either on tracks or trains. Only 5.6% of the fatal accidents were the result of collisions or derailments. Companies operating 139,000 miles of track handled 60% of the country's passenger business and 67% of its freight business without one passenger being killed in a train-accident. One railroad system, the Southern Pacific Co., employing 80,000 men on 11,000 miles of track, carried 45,000,000 passengers without one passenger being killed in train accidents and only five employees.

Visualising dimensions is facilitated in the draft-room of the Crane Co. at Chicago, by means of a horizontal scale-board marked in feet, placed lengthwise of the room near the ceiling, where every man can see the figures without leaving his desk. Heights are shown by a vertical scale-board.—'Mechanical World.'

LONG-SPAN BRIDGES IN AMERICA

The Municipal bridge at St. Louis across the Mississippi river contains the longest simple trusses in America. Their length is 668 ft. between centres of end-pins. The longest riveted simple trusses are in the Terminal Railroad bridge over the Missouri river at Kansas City. The fixed spans are 425 ft. 6½ in. between centres of bearings, and there is a vertical-lift span, 428 ft. long. The bridge of the Portland and Seattle Railroad across the Willamette river at St. Johns, Oregon, contains a swing-span 521 ft. long, the longest in the country. The longest span in a single-leaf bascule bridge is 235 ft., in the Baltimore & Ohio Railroad bridge over the Calumet river in Chicago. The longest double-leaf bascule span, 335 ft., is on the Canadian Pacific Railway over the Sault Ste. Marie canal. The longest cantilever span in the United States is in the Queensboro bridge over the East river at New York. The length is 1182 ft. The longest cantilever span in the world is 1800 ft., in the newly-completed bridge over the St. Lawrence river at Quebec. The longest span of a suspension bridge is 1600 ft. between centres of towers, in the Williamsburgh bridge over the East river at New York. The longest steel-arch span is in the Hell Gate bridge of the New York Connecting Railroad over the East river at New York. It is 977.5 ft. between centres of end-hinges. The longest reinforced concrete arch has a clear span of 300 ft. 4⅞ in. and a clear rise of 67 ft. It is in the Larimer Avenue bridge at Pittsburgh, Pennsylvania.

Reinforced concrete for protecting corroded riveted-steel pipe 24 in. diam. was recently tried by the Temescal Water Co. at Corona, California. The concrete was 3 in. thick, and was reinforced with spirally wound wire-mesh. Forms made of wooden staves lined with No. 26 iron were used. The invert-part of the covering, including about 1/7 of the circumference, was laid first. The concrete was mixed wet and the forms were removed on the second day after placing. The total length of the pipe-line was 10,000 ft. A gang of 12 men could cover 100 ft. of pipe in a nine-hour shift at a cost of $170, including excavation and back-filling.—'Cement and Engineering News.'

To waterproof leather and leave it soft and pliable, apply a mixture of 4 parts (by weight) castor oil, and one part raw rubber. Heat the oil to 250° F., then add the rubber, and cut into small pieces. Stir until the rubber is completely dissolved, and then pour into a vessel to cool.—'Mechanical World.'

The sewer-farm at Nottingham, England, containing 708 acres, yields a net profit of about $3000 per year after all expenses, including depreciation, are deducted. Broad irrigation is used, and the effluent is carried away by under-drains to the river Trent.

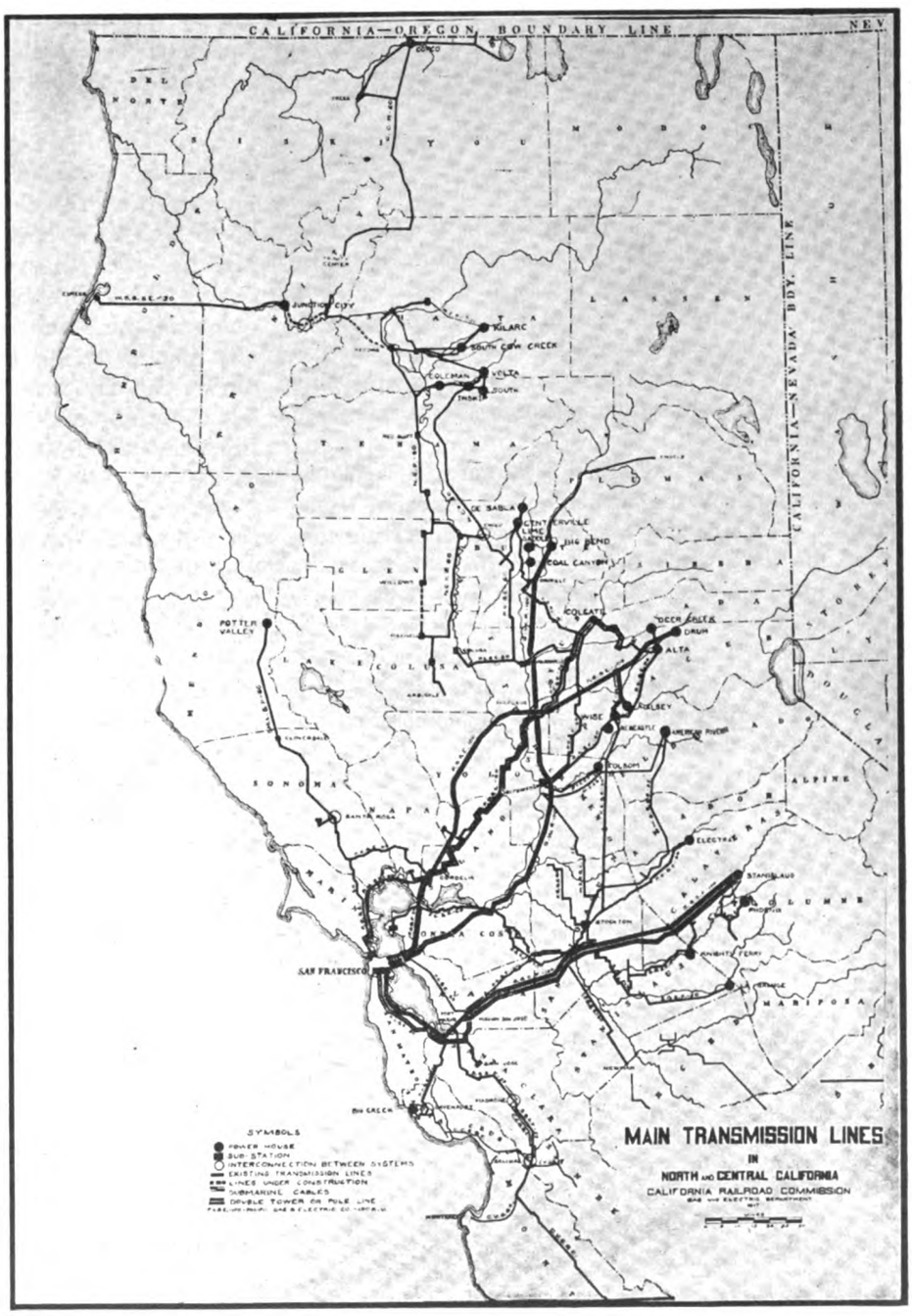
Generated on 2024-09-30 01:38 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Hydro-Electric Power in Northern and Central California*

As a result of the shortage and increased price of fuel-oil, the increased demand for power, and the general war-needs, the power-companies of California are confronted with many difficult problems. To assist in the solution of these problems, the California State Railroad Commission, acting in conjunction with the companies, has been making investigation as to the best means of taking advantage, by inter-connection between the various systems, of the diversity of demand on the systems, and as to general methods for the economic utilization of water resources for the service of the public. A preliminary report has recently been issued covering the principal power-companies of northern and central California, from which many of the data contained in this article have been taken.

The principal companies serving this territory are the Pacific Gas & Electric Co., the Great Western Power Co., the Sierra & San Francisco Power Co., and the Northern California Power Co. Con. The Pacific Gas & Electric Co. buys some power from the Snow Mountain Water & Power Co., and this power has been included with that produced by the Pacific Gas & Electric Co. Although it supplies a relasmall amount of power in California, the California-Oregon Power Co. should also be considered, on account of the power that could be supplied from its plant near the Oregon line, provided relatively short transmission-lines are constructed.

An investigation covering each month of the year ended June 30, 1917, showed peak-loads on the systems of the four principal companies, considered separately, ranging from 217,431 to 247,038 kw. Assuming the four companies to be operated as one system, the combined peak-load would have ranged from 203,852 to 236,293 kw. The diversities between the systems ranged from 600 to 23,050 kw. It is noteworthy that the greatest diversity occurred during the low-water period, showing that the greatest reduction in total load resulting from complete inter-connection between the four systems would have come at the time when the maxi-



MAIN TRANSMISSION-LINES IN NORTHERN AND CENTRAL CALIFORNIA

*From data furnished by G. S. Jacobs, engineer, Gas and Electric Department, California State Railroad Commission, San Francisco.

Generated on 2024-09-30 01:37 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

mum amount of fuel-oil was used. The proportion of hydro-electric energy used varied between 72.2 and 92.8%. The combined load-factor on the systems ranged from 68.7 to 77.6%. The load-factor on the hydro-electric parts of the systems ranged from 70.5 to 83%. The minimum load on the four systems was about 100,000 kilowatts.

The distribution of the load as regards place is fully as important as its amount and its distribution as regards time. Drawing a series of concentric circles 25 miles apart, with San Francisco as a centre, and calling the first zone A, the second zone B, etc., the distribution of load is as follows:

Zone	Miles from San Francisco	Substation peak, kw.	Per cent of total load
A	0– 25	157,500	53
B	25– 50	50,500	17
C	50– 75	25,000	9
D	75–100	34,000	11
E	100–125	23,000	8
F	125–150	5,000	2
Total		295,000	100

The peak-load in San Francisco alone is 96,000 kw., or 32% of the total. The amount of power used in the region adjacent to San Francisco bay is increasing more rapidly than in the rest of the territory served. This is partly because of increased industrial activity, and partly because many large steam-plants are being changed to electric-plants, on account of the increased price of fuel-oil.

In San Francisco itself, further use of hydro-electric power is limited by the capacity of the present transmission-lines. Under the most favorable operating conditions, the maximum amount of power that can be brought into San Francisco is 58,000 kw. This leaves 38,000 kw. of peak-load that must be carried by the steam-plants, without counting the deficiencies in available hydro-electric power at other cities in the bay region, or the allowance that must be made for line failures and for voltage regulation.

A study of the energy generated during the past few years shows that, while there has, of course, been a seasonal variation in demand, the energy used has increased from 91,070,000 kw-hr. in January 1915 to 131,650,000 kw-hr. in July 1917. The following table of probable demand for 1918 has been prepared:

Month	Av. load on systems, kw.	Peak load on systems, kw.	†Load-factor %
January	191,908	267,000	71.8
February	197,102	263,500	74.8
March	193,344	251,800	76.7
April	202,940	264,500	76.7
May	213,459	274,800	77.6
June	217,821	277,000	78.6
July	214,896	269,800	79.6
August	214,896	276,600	77.6
September	225,592	286,900	78.6
October	212,022	283,700	74.7
November	217,821	312,000	69.8
December	214,896	303,500	70.8

†These figures are for average week-days. Sundays and holidays are not included, although they would affect the monthly average.

Assuming that the present increase of 10% or more per year continues, the peak-load and energy output in 1923 will be approximately twice the load in 1915. To supply this demand, the power-companies must add 30,000 kw. each year to their capacity. At an average cost for development, including transmission, or at least $150 per kilowatt of capacity, this calls for an annual expenditure of not less than $4,500,000. The financial problem alone is therefore of considerable importance.

An estimate has been made of the possible increase in output of hydro-electric power during 1918 by the principal companies. The Pacific Gas & Electric Co. by completing the work on the lower end of the Spaulding project, which will permit the full operation of the Halsey and Wise plants, together with the recently completed Tunnel plant at Lake Spaulding, will be able to produce 150,000,000 more kilowatt-hours in 1918 than in 1916. The main plant of the Great Western Power Co. at Big Bend is operated to its full capacity during the peak-load period, and at a fairly high load-factor during the entire day. There is still available about 30,000 kw. between 11 p.m. and 5 a.m. if storage facilities were enlarged. By using this block of power during the night, thereby permitting the regulating plants of the other companies to store water at their own plants during that period for additional peaks during the day, a net increase of about 8000 continuous kilowatts can be obtained. The capacity of the Big Bend and Butt Creek plants is a little more than 65,000 kw. The Stanislaus and Phoenix plants of the Sierra and San Francisco Power Co. are operated at the full rated capacity of their equipment. The Stanislaus plant has 300 acre-feet of forebay capacity for regulating purposes. This is sufficient to carry the full plant-load for eight hours. The Phoenix plant has ample water for all times. The capacity of the two plants is about 20,000 kw. The Northern California Power Co. with its present facilities can produce 20,000 kw. throughout the year. By making some changes and repairs, and by reconstructing the Coleman-Chico transmission-line, this can be increased to 28,000 kw. The California-Oregon Power Co. at the present time is not connected with the lines of the companies serving the bay and valley regions, but if the necessary transmission-lines were built, about 8000 kw. of surplus power from the Copco plant could be obtained from this company.

During 1917 it is estimated that 1,508,560,000 kw-hr. of electric energy was produced, of which 1,342,000,000 kw-hr. was produced at hydro-electric plants, leaving 166,560,000 kw-hr. produced at steam-electric plants. Assuming that the changes in the equipment of the companies are made as outlined above, and that a sufficient number of inter-connections are made to permit operating the systems of all the companies as one system, the following table shows the probable energy production in 1918, assuming an average year's water-supply.

Generated on 2024-09-30 01:37 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Month	Hydro-electric energy available, kw-hr.	Auxiliary steam energy to be supplied, kw-hr.	Total energy requirements, kw-hr.
January	126,330,000	7,620,000	133,950,000
February	116,580,000	6,800,000	123,380,000
March	133,180,000	1,770,000	134,950,000
April	136,570,000	190,000	136,760,000
May	141,540,000	7,410,000	148,950,000
June	138,460,000	8,300,000	146,760,000
July	140,470,000	9,480,000	149,950,000
August	132,590,000	17,360,000	149,950,000
September	121,630,000	25,130,000	146,760,000
October	132,870,000	15,080,000	147,950,000
November	130,130,000	16,630,000	146,760,000
December	133,040,000	16,910,000	149,950,000

At present, the deficiency of rainfall indicates a reduced supply of hydro-electric power and consequently a larger amount of steam-generated energy.

The principal inter-connections suggested are between the lines of the Pacific Gas & Electric Co. and the Great Western Power Co. at Nicolaus and between the Pacific Gas & Electric Co. and the Sierra & San Francisco Power Co. at or near Stockton and at some point near the southern end of San Francisco bay. If additional transmission-lines are built from the northern part of the State, the best points of connection are at Chico on the east side, and at Yolo or Woodland on the west side of the Sacramento valley.

If these inter-connections are made and the companies increase power-plant capacity as outlined above, a saving of over $200,000 worth of fuel-oil per year can be made. Had separate operation been continued, the only way to satisfy the increased demand would have been by the use of steam-produced energy. This would require over 1,000,000 bbl. more of fuel-oil per year than the present consumption. At the present time, the three companies operating in San Francisco, the Pacific Gas & Electric Co., the Great Western Power Co., and the Sierra & San Francisco Power Co., have strengthened their tie-lines and are now co-operating in the production of auxiliary steam-power, thereby conserving their hydro-electric resources as much as possible. Plans are now under consideration for a material reduction in the power shortage by further co-operation among these companies. Similar work is being done in southern California.

Cost of melting brass in an electric furnace, according to T. F. Bailey in the 'Journal' of the Cleveland Engineering Society, is as follows:

	Per ton
Electricity, 400 kilowatt-hours, at $0.01	$4.00
Metal loss, 1% zinc, at $0.10 per lb	2.00
Labor, 3½ hours, at $0.36	1.20
Renewals and repairs	1.00
Total	$8.20

Grinding aluminum is easily accomplished by using ordinary machine-oil as a lubricant. It has no effect on the grinding-wheel, which will last longer for aluminum than for cast-iron.—'The Gas Engine.'

COST OF OPERATION OF PASSENGER-ELEVATORS

The following data regarding operation of electric passenger-elevators at the Young Men's Christian Association building in New York are taken from the 'National Engineer.' The elevators are of the drum type, with magnetic control.

Car Mileage

Elevator 1—Average 5 miles per day
Elevator 2—Average 12 miles per day
Elevator 3—Average 11 miles per day
Elevator 4—Average 14 miles per day

Total ..... 42 miles per day
Total mileage for 13 years 199,290

Cost of installation, 3 elevators, 1903	$13,800
Cost of installation, 1 elevator, 1905	4,500
	$18,300

Operating Costs

Year	Cable	Supplies and repairs	Total
1904	$ 80.00	$ 21.25	$101,25
1905	150.00	26.82	176.82
1906	61.40	65.64	127.04
1907	239.00	91.50	330.50
1908	170.00	121.90	291.90
1909	170.00	59.70	229.70
1910	355.00	82.55	437.55
1911	170.00	59.16	229.16
1912	253.94	38.20	292.14
1913	286.16	48.00	334.16
1914	226.96	198.55	425.51
1915	58.25	106.79	165.04
1916	73.20	15.30	88.50
1917	67.13	155.00	222.13
	$2,361.04	$1,090.36	$3,452.40

Summary of Costs

Cost of cable per foot	$0.12
Cost of cable per car mile	0.0115
Cost of cable supplies and repairs	0.016
Total cost	$0.0275

Total power consumption, 777,435 kw. in 13 years.
Total power-cost at 2c., $15,548.70.
Average kilowatts per day, 163.
Average kilowatts per car mile, 3.9.

Average cost per car mile	$0.078
Average cost per car mile, labor	0.006
Average cost per car mile, supplies and repairs	0.016
Average cost per car mile, cable	0.0115
Average cost per car mile, depreciation	0.00786
Total cost per car mile	$0.11936

Cars travel 125 ft. at 250 ft. per minute.

Maintenance of concrete highways in Wayne county, Michigan, during 1917, according to the Eleventh Annual Report of the Board of County Road Commissioners, cost $5475.76, or $36.50 per mile. The cost of maintaining two miles of macadam road during the same period was $831.11. During the season of 1917, 156,595 sq. yd. of concrete pavement was constructed.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Status of the Engineering Profession

At the meeting of the San Francisco Association of Members of the American Society of Civil Engineers held December 18, there was a general discussion of the question 'Why Engineers Have Not Achieved Higher Rank Among the Professions', of which the following is a summary.

In opening the discussion, Jerome Newman, president of the association, called attention to the fact that engineers are seldom chosen for high executive positions, or on boards and commissions, such as the State public-utility commissions. "Something is certainly wrong," Mr. Newman said. "The question of the evening is 'What is it?' "

C. D. Marx pointed out that there are two ways to begin in analyzing the question, 'Why Engineers Have Not Achieved Higher Rank Among the Professions?' Either (1) the fault is with the public, or (2) it is with the engineer. If the first supposition be true, it must be that the work done by engineers can be recognized only by those who understand engineering. If so, the degree of recognition accorded engineers would be a gauge of the intelligence of the community, and as the intelligence of a community grew, engineers would receive better recognition. On this basis, and, in fact, to a certain extent on any basis, engineers have duties in educating the people of their communities on the subject of engineering. Taking the second supposition; if the engineer is at fault, it is because his training has been narrow. We have little enough time as it is for training engineering students and it is difficult to get them to see the need of broad training outside strictly technical lines. Abroad, the plan is, first, to give instruction along lines of broad training, and, later, to specialize. As a result, professional standing is commensurate with this knowledge and training. It is a sad commentary on engineering to note how little the public knows of engineering work. If the engineer has proper breadth of training he will be able to impress his personality on those with whom he deals. The engineer must recognize it as his duty to do this. At a recent convention of city managers, 75% of those attending were engineers. This indicates progress. It has been urged that engineers should be put upon the public-utility commissions. With such moves as this the engineer will in time come into his own, but progress toward this end will be dependent upon the engineer, and this in turn will be influenced by the breadth of his training.

R. S. Chew expressed a desire to see engineers, generally, developing more in ingenuity and thinking capacity. "We are inclined to be methodical rather than logical," he said, "to accept rather than to reason." It may be that handbooks have been an evil influence in this line. The engineer deals chiefly with laws that restrict what he can and cannot do, and therefore he develops the habit of thinking under limitation. This is a handicap in developing thinking capacity and business judgment, and the engineer is rated accordingly by the public.

C. H. Snyder expressed the opinion that engineers are, in fact, getting along as well as could be expected. There are several needs that stand out prominently, among which are (1) the need of educating the public on the subject of engineering; and (2) the need of some co-operative movement that will make for solidarity and that will eliminate the lack of unity among engineers, which is now such an obstacle to the advance of the profession. In general, conditions and prospects are not so serious as the subject of the evening would indicate. The profession is steadily improving.

C. J. Rhodin recalled a discussion of this same subject in 1898, which he cited to show that movements of this sort have received attention of our professional brothers elsewhere. An emissary from Scandinavia arranging for trade connections disapproved of a list of business men that Mr. Rhodin had prepared, and pointed out that on matters where rational and vigorous attitude of mind were required it was desirable to deal with young engineers. This emissary had been following such a policy with success in his own country and had expected to apply it here. The compensation and standing of engineers is not what it should be, because they are by habit of mind conscientious, bent on self improvement, and absorbed in the details of their work, all of which leads them away from the opportunity to meet with people and inform them what the engineer really is and what he can do. Engineers lack in co-operation. They should mingle more with the public, take part in public affairs, and avoid anything that savors of internal profession dissension.

H. D. Dewell stated that before material progress could be made in raising the standard of the civil engineer among other professions some method must be evolved for distinguishing between different classes of engineering work. Engineers who confine their activities strictly to professional work should be classed separately from engineers whose work is largely along business lines. The tendency of the times seems to be strongly toward the commercializing of the engineering profession. If the engineer desires to work on a commercial basis, that is, to employ the methods of the salesman in doing free work in the hope of profiting if the job is done, well and good. However, if he employs business methods rather than strictly professional methods he must expect classification as a business man and not as a professional man. In short, distinction should be made between the professional engineer and the contractor, no matter how highly trained the latter may be or how closely he may stick to the ethics

Generated on 2024-09-30 01:42 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

of his branch of the profession. The strictly professional civil engineer, by employing the methods of the salesman, gains nothing from the professional and little from the financial standpoint. On the other hand, both by individual and collective effort, professional civil engineers can so regulate their methods of work that the general public will rate them on a par with members of the other professions. Incidentally, they will probably die poor. There is no question about the better chances for profit in the commercial side of engineering. At the same time it is probable that the contracting and commercial engineers as a class are likely to be less ethical than their professional brethren. If engineers desire to raise the rating that they are accorded by other professional men, it is necessary that the engineers' standards conform more closely to the ethics of the other professions, a move which may not be feasible or desirable. Some engineers that have achieved high standing would have gained prominence, no matter what line of work they followed. Moreover, if a man aims at a high executive position, his training should not be straight engineering. The question of high rank professionally is largely personal. The individual must reason out what he desires to attain, and having found that object, diligently devote his talents to realizing his ambitions.

G. L. Dillman said, in part, "Engineering is the noblest profession, when service to the human race is considered. Service is the real purpose of life. It is the only thing that produces wealth, health, and happiness. Other things, like selfishness, may concentrate wealth. A knowledge of hygiene may stave off sickness. Temporarily, we may have a kind of felicity from catering to our false notions of possession. But at the very foundation of things, service is the only source of supply, of health, wealth, or happiness. 'Engineering is the only learned profession,' said a noted educator, who also held that medicine is empirical, law experimental, and theology visionary. When the engineer gets knowledge of a law, it remains a law. But the next court decision or act of the legislature may repeal the law of the lawyer. So also with other professions—medicine, for example. The material progress of the human race is solely along engineering lines. This must be taken in the broadest sense, namely, that any occupation which deals in natural force is engineering. Thus, surgeons, dentists, and chemists do certain engineering work. Law is a wonderful study, but the results to date are no advance on the Medes and Persians. The study of medicine is attractive, but the health of today is certainly not better than of old, and longevity is less. The most potent medicine in the cure of disease, quinine, we got from the Aztecs or the Incas, and we have never developed anything in the line of specifics to equal it. Every man to his trade. When you adopted engineering you were right to give up wealth and other cheap luxuries for the privilege of following the greatest profession in life."

A. H. Markwart said, "Most of us will concede that the average engineer is honest and industrious, has technical knowledge and does his work carefully and accurately, but can it be truly said that this same engineer is a business man, possessing administrative ability and political, social, and common sense? If so, there would have been no grounds for this discussion."

The condition of the engineer, Mr. Markwart believed, would be greatly improved were his college education broader and not confined to technical studies. To some extent, general courses should be added to the college curriculum, at least enough of these to develop in the engineering student a desire to inquire into liberal subjects, in order to be able to read, write, and speak, so that when opportunity offers he will be qualified to fill superior positions in the business and social world. Colleges should deal with the ethics of engineering to the end that it be instilled in the mind of the student that the engineer is one to be trusted, one who will work according to a high moral standard, and whose opinion and advice will be sought when other sources fail. Moreover, it would be well for all engineers to be more generally guided by a code such as that recently adopted by the American Society of Civil Engineers.

One trouble with the engineer is that the public does not know exactly what he does. Many people know in a vague way that he builds things, but it is desired that the public be brought to realize more fully the engineer's larger problems so that the term 'engineer' will be understood to mean a man of broad and extensive qualifications. There is a great sphere that the engineer can fill in the future if the public gets a proper comprehension of the engineer's abilities. It rests largely with the profession to accomplish this. Another point is that the engineer does not get high political positions, notwithstanding the many places in public life that he could fill admirably by reason of the fact that he is a logical and careful thinker with a responsive and receptive mind on ordinary problems. It would profit the public much to include the engineer among the members of regulating bodies. His acquaintance with the many technical details which go to make up the charges for public service rendered makes the engineer peculiarly fitted to serve on public commissions. The profession has improved amazingly, only we want still more growth to meet the modern trend of affairs. A few years ago the engineer was exclusively the surveyor, technical worker, or builder, we now find him, at times, the adviser in actions or disputes of various sorts, filling executive positions, managing cities, serving on commissions, and generally reaching out for a broader field of effort. Nevertheless, a certain amount of discontent is legitimate and makes further progress possible.

In conclusion, the condition of the average individual engineer will be improved by the possession of broader education, general culture, engaging personality, and executive qualities, to the end that he may

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

take the larger place in the modern scheme for which these wider qualifications would naturally fit him. Back of the individual, to support him in this legitimate ambition, should be the profession at large, with closer organization, definite standards of ethics, and accepted practice. With this and an ever widening field of effort ahead, our engineers should attain the highest order of success.

A committee composed of N. A. Bowers, H. D. Dewell, and C. J. Rhodin was appointed to study the discussion of the evening and to make recommendations. The conclusions and recommendations of the committee were substantially as follows:

Both the public and the engineer would benefit if engineers were more active in public affairs and had a higher professional standing in the eyes of the public and the other professions. If a change in the status of the engineer is to be brought about, engineers themselves must take the initiative. The question then becomes, what action is desirable?

The first step is to establish clearly just what kinds of engineers we are considering and what distinguishes one class from another. The term 'engineer' is now extremely indefinite. Even 'civil engineer' is too broad to constitute a classification. This committee having been appointed by a civil engineers' society, limits its attempts at classification of engineers to those usually included in the general class of 'civil engineers.' As a starting point, therefore, the committee agreed upon three classes, namely: those who plan or design, those who assemble or erect, and those who manufacture or sell. These classes were selected as permitting of a distinction professionally in the kinds of work included.

In other professions there are sharp lines of demarcation; the architect is not easily confused with the builder or with the manufacturer of building materials; the profession of the physician is distinct, and excludes the druggist and the chemical manufacturer. But the civil engineers have not taken pains to establish such distinctions. Commercial activity has become so closely identified with professional activity in civil engineering that even engineers have difficulty in drawing the line. The layman is naturally less able to do so and therefore a 'civil engineer' is generally considered to be a man with specialized training, engaged in a technical phase of commercial activity.

It is not intended to imply that the commercial side of engineering is less creditable than the professional. On the contrary, it is often of great advantage to the engineer to have had experience as a contractor, or to be able to see and appreciate the viewpoint of contractor or manufacturer. But commercial and professional work should be differently classified. The ethics of each class should be prescribed so that by creditable work of a certain class an engineer helps to raise the professional standing of that class. This is particularly true in the case of those who plan and design. By thus classifying their activites the civil engineers would be able to make a far stronger stand on questions such as the licensing of engineers. The licensing question is sure to face us sooner or later and if we have no satisfactory definition and classification of our own, we shall have one thrust upon us by those who frame the new statutes.

This committee therefore recommends that:

1. The San Francisco Association of Members of the American Society of Civil Engineers appoint a committee to give to this subject further and more definite study.

2. That this committee in connection with such further study

(a) Prepare an up-to-date definition of what constitutes a civil engineer.

(b) Prepare an up-to-date definition of a consulting engineer.

(c) Classify civil engineers professionally into classes for example, as those who plan or design, those who assemble or erect, and those who manufacture or sell.

(d) Prescribe the ethics or standards by which these classifications shall be established.

CONSTRUCTION OF STANDARDIZED CONCRETE HOUSES

One hundred concrete dwelling-houses were recently built at Donora, Pennsylvania, for the American Steel & Wire Co. by the Aberthaw Construction Co. The methods of construction are discussed in an article in 'Portland Cement.' These houses were of eight different styles and contained from four to six rooms, together with bathroom and cellar. The cost complete, including plumbing, heating, wiring, and kitchen equipment ranged between $2000 and $3300. All the houses were of the box type, and had solid reinforced concrete walls 6 in. thick. Each house had a flat concrete roof, on top of which was placed a wooden frame covered with asbestos slate. Steel forms were used. The houses were constructed in groups, the concrete for each house being placed in about three weeks.

Screw-spikes for railroad track as compared with nail-spikes have been tested in several stretches of experimental track on the Pennsylvania Railroad. A report of the tests is given in a recent bulletin of the American Railway Engineering Association. The bulletin states that screw-spikes cost considerably more than nail-spikes and that the cost of maintenance is also higher. While at first the screw-spike holds better, it soon becomes loose as a result of the undulating action of the rail. The nail-spike under similar circumstances retains a considerable part of its holding power.

A wash for waterproofing concrete may be made from a stock-solution composed of 1 lb. lye, 5 lb. alum, and 2 quarts of water. A pint of this solution may be added to 10 lb. of cement and a bucket of water. This will make a paint-like mixture that may be applied with a brush.

Generated on 2024-09-30 01:45 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

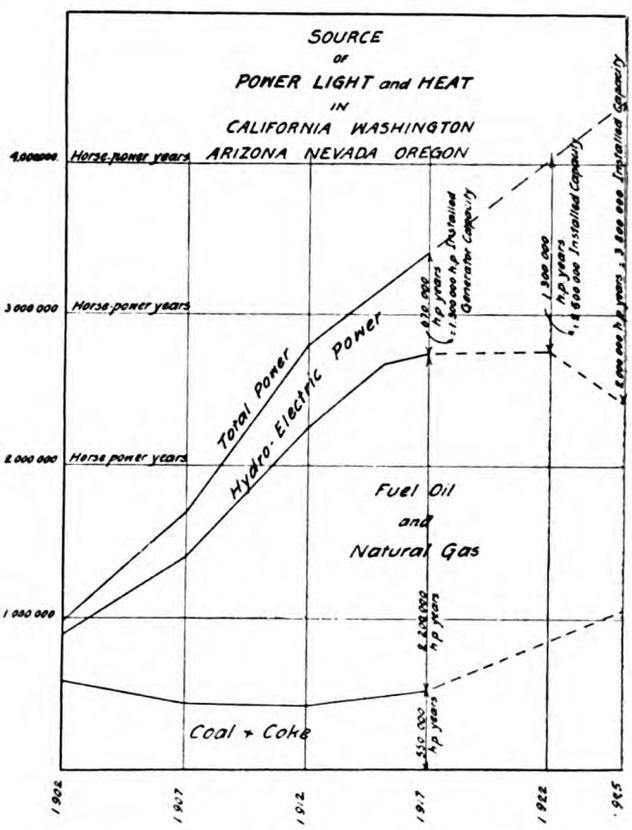
Sources of Power on the Pacific Coast

By AN OCCASIONAL CONTRIBUTOR

The future development of the Pacific Coast is dependent upon fundamental industrial and commercial factors similar to those controlling recent development in other parts of the United States. Briefly, the requirements for the industrial growth of any district are: first, cheap and abundant supply of fuel for the development of power; second, a supply of raw material which may be either agricultural products (including timber), mineral products, or, to a limited extent, products of the sea; third, transportation facilities for the delivery and shipment of raw and manufactured materials. In addition to these essential conditions, the supply and adaptability of labor and the availability of capital control the rate of development to a great extent. Finally, an expanding market for the industrial products is required.

Since power is not only essential to industry, but also to transportation, it is the first essential to the development of any part of the country. The importance of Cleveland, Pittsburgh, and Birmingham as industrial centres is caused by their close proximity to coalfields; while the manufacturing districts of New York and New England are dependent upon cheap water-power from Niagara and from the rivers of the North Atlantic Coast. The total power resources of the Pacific Coast are not definitely known, but even a limited survey is suggestive of the relative importance of different sources of power for further industrial use. Fuel has been an important temporary source for the development of local power, but unfortunately the fuels of the Pacific Coast are not widely distributed, and a great part of the territory must, therefore, pay a heavy transportation charge for its fuel supply.

Central and southern California have for a decade been supplied with cheap fuel in the form of oil, and large quantities of this oil have been distributed in northern California, Washington, Oregon, British Columbia, Nevada, and Arizona. The rapid industrial development of the Coast since 1900 is largely due to cheap power obtained from this source. Various estimates have been made of the quantity of oil remaining under ground in the present proved oilfields of California. The most conservative and reliable of these estimates indicates a total recoverable reserve of two to three billion barrels. The present rate of consumption of Californian oil is 110,000,000 barrels per year, which indicates that the reserve supply is not sufficient to maintain production long, much less to permit increased production to provide for growing industrial needs. Increased demand from the industrial sections adjacent to the oilfields and from the Californian railroads will soon consume the entire production of the State, and will leave no surplus for shipment. Even this favored local area cannot long be served with sufficient fuel-oil to meet its requirements, as it has been definitely established from the history of all oilfields that a decline in rate of production is inevitable. Coal is found in quantity in western Washington and British Columbia, and on Vancouver island. The development of these coalfields has been slow, and has been retarded in the past fifteen years by the low price of oil. With the present shortage of oil, and the increased prices, the coal-operators of the North-West

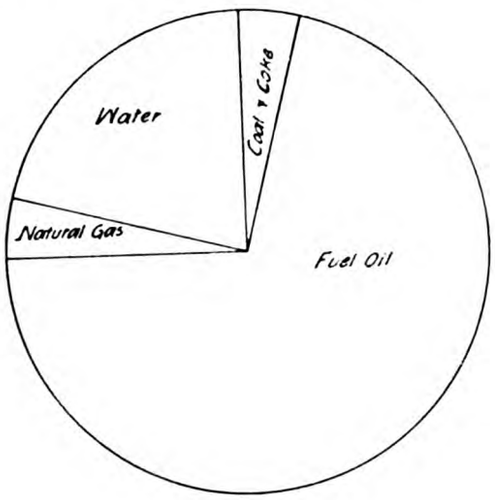


PAST, PRESENT, AND PROBABLE FUTURE DIVISION OF POWER SUPPLY

are endeavoring to increase their output, but they will be able to take care of local requirements only. From a study of these facts it is evident that the future supply of power on the Pacific Coast must come from the perennial streams that flow from the Cascade and Sierra ranges. At the present time, approximately 20% of the total power utilized on the Pacific Coast is developed from hydro-electric plants, while 70% is obtained from fuel-oil and natural gas. The power requirements of the Pacific Coast are increasing at a rate of 10 to 15% per annum. With the output of oil barely maintained, or, perhaps, declining each year, this increase must be met

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
UNIVERSITY OF ILLINOIS AT
URBANA-CHAMPAIGN

entirely by the development of more hydro-electric power. A conservative estimate of future requirements shows that the installed generating capacity of hydro-electric



Total Fuel + Power equivalent to	2 000 000	Horse power years
Coal	95 000	" " "
Fuel Oil	1425 000	" " "
Natural Gas	100 000	" " "
Water	380 000	" " "

SOURCES OF POWER, LIGHT, AND HEAT IN CALIFORNIA IN 1917

plants on the Pacific Coast should be doubled in five years, and tripled in eight years to meet the local requirements of the Pacific Coast for power, light, and heat.

GAUGES OF RAILROADS IN NORTH AND SOUTH AMERICA

In a paper presented before the Second Pan American Scientific Congress, F. Lavis gave the following statistics regarding the mileage of railroads in North and South America. 'Narrow' gauge includes gauges from 2 ft. to 3 ft. 6 in. 'Standard' gauge is 4 ft. 8½ in. or approximately that width. 'Broad' gauge is from 5 ft. to 5 ft. 6 in. In the United States, Canada, and Mexico, the figures are: Narrow gauge, 14,561 kilometres. Standard gauge, 464,735 kilometres. In the West Indies and Central and South America there are 44,631 kilometres of narrow-gauge line, 12,740 kilometres of standard-gauge, and 22,185 kilometres of broad-gauge. Of the narrow-gauge road, 37,322 kilometres is one metre wide. This is mainly in Argentina and Brazil. Of the broad-gauge road, 19,904 kilometres is in Argentina.

An all-welded piping system has recently been completed for a brewery, the suction-gas (ammonia) system having been remodeled by welding the whole to eliminate joints. The oxyacetylene process was used for welding the joints.

CONSERVATION OF FUEL BY RAILWAY ELECTRIFICATION*

By W. D. BEARCE

The steam railroads of the United States use annually 135,000,000 tons of bituminous coal, 6,735,000 tons of anthracite, and 42,000,000 bbl. of fuel-oil. This is one-fourth of the total amount of coal and one-seventh of the total amount of oil consumed in the country. The steam locomotive is an isolated power-plant of low efficiency. The average consumption of coal per kilowatt-hour is 7 lb., against 2½ lb. in a well-designed central station. This does not, however, indicate the total saving of coal that is possible as a result of electrification. The revenue-tonnage of an electrically operated train is considerably larger than that of a steam-operated train of the same gross weight, not only because of the weight of coal in the locomotive-tender, but also because of the necessity of hauling coal for train-operation from the mines to the coaling-points. In addition, a large number of railroads now operated by steam are so situated that hydro-electric power could be used.

In the United States 2358 miles of railroad that was formerly steam-operated has been electrified. The voltage ranges from 600 direct-current to 11,000 alternating, the highest direct being 3000 and the lowest alternating being 3300. Steam-electric power operates 1485 miles of road, and hydro-electric power 873 miles. The estimated total amount of coal saved per year by the electrification of this 2358 miles of road is 1,643,000 tons. It is probable that the electrification of all the railroads in the United States would result in the saving of over one hundred million tons of coal and several million barrels of oil per year.

Carbon content of steels and its effect on their properties is shown in the following table, taken from 'The Scientific American':

Carbon content, %	Characteristic	Remarks
1.58	Will not weld	Seldom used.
1.38	Will weld	Used for hard tools.
1.1	Welds fairly	Used for chisels.
0.88 to 0.6	Welds easily	Used for files.
0.62 to 0.38	Welds readily	Used for rails and tires.
0.38 to 0.15	Will not temper	Used for boiler-plate.
0.15 to 0.05	Will not temper	Substitute for iron.

The total oil production in the United States during 1917 was 341,800,000 bbl., as compared with 300,767,158 bbl. in 1916, which was itself greater than that of any preceding year. The increase was mainly in Oklahoma and Kansas, which produced 115,809,792 bbl. in 1916 and 147,000,000 bbl. in 1917, and in California, which produced 90,951,936 bbl. in 1916 and 97,000,000 bbl. in 1917. The total consumption was 363,000,000 bbl. The draft on stored oil was mainly in California and Illinois.

*Abstract from 'General Electric Review.'

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

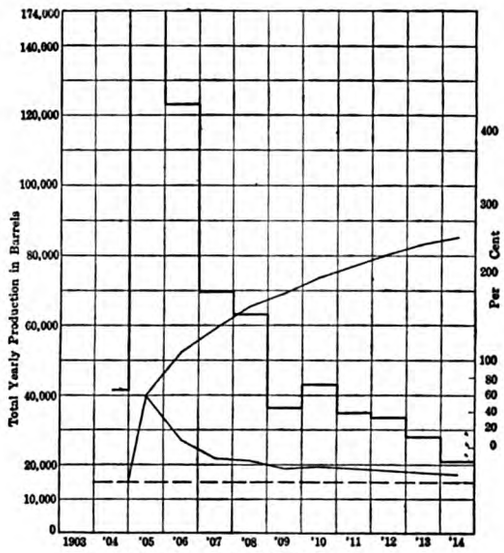
Proposed Methods for Estimating the Future Production of Oil Wells*

By J. O. LEWIS and CARL H. BEAL†

In developing the following methods for the estimation of the amount of oil that can be obtained from a property under given conditions, the production records of several properties in two oilfields several miles apart in north-eastern Oklahoma have been studied. The first is in the eastern half of the Osage Indian Reservation, and the records represent properties scattered over a district about 60 miles long by 20 miles wide. Over such a large area there is a great variety of oil-sand depths, sand-conditions, etc. The records from 68 of these properties, including more than 1000 wells, were used in the determination of the results presented. For the purpose of comparison, 64 properties including 675 productive wells were also studied in the Nowata field, about 25 miles east of the Osage Reservation. Because the productive sand in the Nowata district is more uniform in depth, and conditions throughout the field are more regular than in the Osage Reservation, and because the properties studied are practically in one pool, more uniform results were obtained from them than was possible from the widely distributed properties studied in the Osage Reservation.

It must be remembered that the following deductions have been made as averages. Any operator can cite instances where wells have proved more productive or less productive than the average well. Some wells may start producing at a certain rate and the production may increase for several years, or it may remain stationary for months. Again, the well may produce as an ordinary well for a few months, suddenly stop, and begin producing again after a few months or years. That the following results are based on averages of fairly regular wells must be emphasized. Estimates of future production of extraordinary wells cannot be made accurately by the application of the principles set forth; in fact, no amount of data will allow one to make an accurate estimate of the future production of a 'freak' well.

The records of the properties in these fields gave the production by years and the number of wells producing each year; records of individual wells could not be obtained. From the records available, the average daily production per well during each year was computed. The figures of average daily production of properties not too confused by irregularity of development were reduced to percentages, the average daily production for the initial year being assumed as 100% and the average daily well productions for succeeding years being expressed in percentages of the first year's average daily production. Thus, if the daily production per well was: first year, 25 bbl.; second year 15 bbl.; third year, 10 bbl.; the percentage record would read 100%, 60%, and 40%, respectively. These percentages, instead of the average daily production, were platted on rectangular co-ordinate paper. The resulting percentage-decline curve was projected to estimate future annual productions expressed in percentages of the first year's production. The minimum profitable daily production was assumed as 1 bbl. per well in the Osage Reservation and ½ bbl. per well in the Nowata field. The method of plotting these percentages on cross-section paper is illustrated in Fig. 1, which represents the curve of a typical Osage property. The heavy curve in these figures represents the total production of the property. Fig. 2 gives the curve of a typical property in the Nowata field, and shows also the form devised for keeping production data.



Lot 49, Barnsdall Oil Co., Osage

Per Cent.	Bbl. Per Well-day	Date	Prod.	Wells
.....	....	July, 1904	41,694	.
100.0	23.9	Year 1905	174,085	20
48.5	11.6	Year 1906	123,506	29
27.2	6.5	Year 1907	69,707	29
24.7	5.9	Year 1908	62,768	29
15.1	3.6	Year 1909	36,460	28
17.5	4.2	Year 1910	42,875	28
14.3	3.4	Year 1911	35,009	28
13.7	3.3	Year 1912	33,522	28
11.5	2.7	Year 1913	27,984	28
8.5	2.0	Year 1914	20,845	28

FIG. 1. PERCENTAGE-DECLINE AND CUMULATIVE-PERCENTAGE CURVES FOR PROPERTY IN OSAGE RESERVATION

From the percentage-decline curves, cumulative-percentage curves were constructed by adding the past percentages of each successive year to the end of the pro-

*Abstract of paper presented at the New York meeting of the American Institute of Mining Engineers, February 1918.

†Petroleum technologists, U. S. Bureau of Mines.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

jected decline curve, as in **Fig. 1** and 2. Thus, using the figures given above, the cumulative-percentage curve reads 100% the first year, 160% the second year, 200% the third year, etc. The end of the projected curve is where the well reaches its minimum economical production. The cumulative percentage at this point expresses the percentage-relation between ultimate production and the production of the initial year. Thus, calculations based on the projected curve of a group of wells showing a total cumulative of 400%, indicate, when applied to a single well, that a total of four times the production of the first year should be obtained by the time the well reaches its minimum limit of profitable production.

In order to make a systematic comparison, the combined initial productions (average daily production per well during the first year) of the wells on each of the 68 Osage properties were platted against the total cumulative percentage of that property. Thus each dot on Fig. 3 represents the total cumulative percentage for

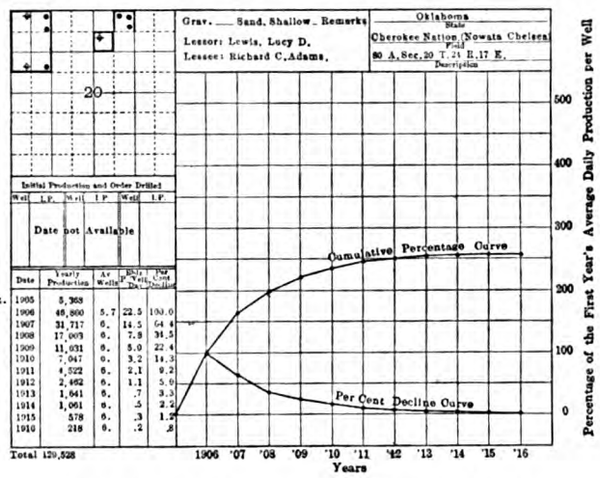


FIG. 2. CURVES FOR PROPERTY IN NOWATA FIELD

a property with a certain average daily production per well the first year. After all the properties were represented, the numerical average of the dots between each set of vertical lines was obtained. These average points were then connected by lines which made an irregular curve from which the curve representing the average total cumulative percentages was determined. The maximum and minimum cumulative-percentage curves were then drawn, their position being determined by the outermost dots. The maximum, average, and minimum total-production curves were derived from the curves just discussed.

There is a marked tendency for the larger wells to have small cumulative percentages, indicating more rapid declines. Conversely, the smaller the well, the more gradual the decline and the larger the cumulative percentage, with the exception of wells whose initial productions were already near the profitable minimum production. From Fig. 3 it will be seen that in the Osage Reservation the average 10-bbl. well shows 420% total cumulative, whereas the average 250-bbl. well shows only 150% and the average 100-bbl. well shows 225% total cumulative production.

It will be observed from Fig. 3 and 4 that wells of the same output during the first year show considerable variation in total cumulative percentages; for example, a 25-bbl. well in the Nowata field shows a minimum total cumulative of 135%., a maximum of 250%, and an average of 190%. This condition is in accordance with the observed fact that wells of the same initial yield may decline at different rates and will, therefore, afford dif-

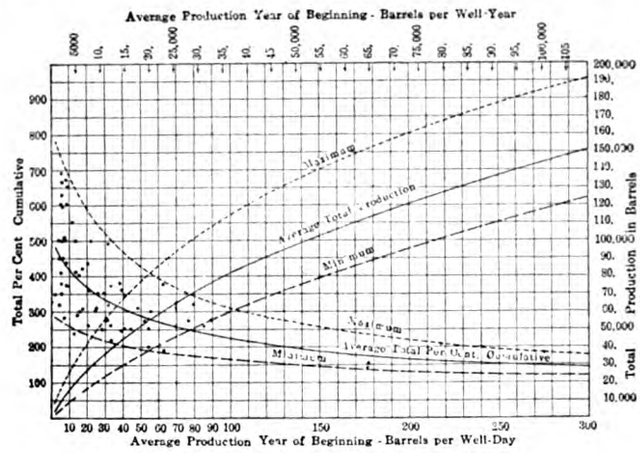


FIG. 3. CURVES FOR 68 PROPERTIES IN OSAGE RESERVATION

ferent ultimate productions. It will be seen, however, that there are distinct maximum and minimum limits. In the figures these limits are shown to extend along either side of the average curve. It will likewise be observed that there is considerable regularity in the variation or deviation from this average and, in parts of the curve affected by the greatest number of records, there is a distinct tendency to bunch along the line of

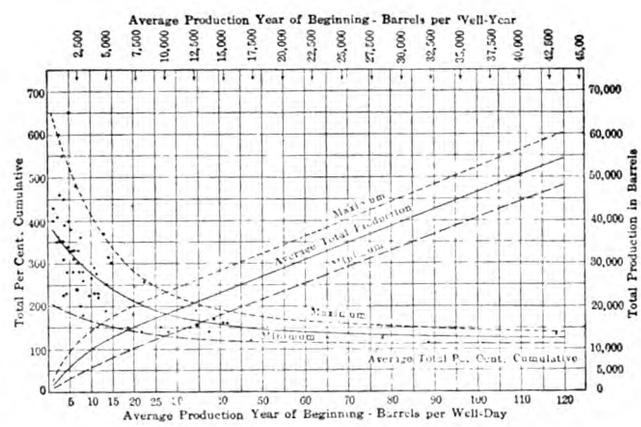


FIG. 4. CURVES FOR 64 PROPERTIES IN NOWATA FIELD

averages. This is particularly noticeable in the Nowata curve.

If, in the future, a group of wells should be drilled in the eastern part of the Osage Reservation or in the Nowata field, their average production can confidently be expected to fall, with perhaps a few exceptions, within the maximum and minimum limits of these curves and, in the majority of cases, nearer to the average than to

Generated on 2024-09-30 01:36 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

either of the extremes. The curves shown in Fig. 3 and 4, therefore, indicate the probable limits of the productivity of wells of various sizes in these two fields.

Although the cumulative percentages are less for the larger wells, the actual total production of such wells is large and is usually in direct relation to the initial yield of such wells. This is shown in the curves of total production in Fig. 3 and 4, platted to bring out this relation by multiplying the first year's production of wells of various initial capacities by their respective cumulative percentages. Thus, on the Osage curve a well that produces 25 bbl. daily produces about 9000 bbl. per year. On an average, such a well has a cumulative percentage of 350%, giving an estimated total production of about 32,000 bbl. The same total-production curve could have been constructed by platting the total productions to date plus the estimated future productions of the average well for each property. From these curves, when the first year's production of a well or a group of wells is given, it is possible to determine the minimum amount of oil that probably will be produced, the maximum to be expected, and the amount that the average well of corresponding initial yield will ultimately produce.

After the appraisal curves have been prepared for a property, the procedure to determine the future output is as follows:

If a group of wells in the Osage Reservation produced 20 bbl. daily during the first year, the future production of one of these wells may be obtained by following the 20-bbl. line from the lower left-hand corner of Fig. 3 to its intersections with the maximum, average, and minimum total percentage cumulative curves. These percentages may be read directly from the left margin. They are 590%, 370%, and 240%, respectively. In other words, a well that produced 20 bbl. per day the first year will have a maximum ultimate production of 43,000 bbl., an average ultimate production of 27,000 bbl., and a minimum ultimate production of 17,500 bbl. These ultimate productions, of course, include the first year's production, or 7300 bbl. Deducting this first year's production from the ultimate-production figures just obtained, the future production of a 20-bbl. well in the eastern part of the Osage Reservation will be: maximum, 35,700 bbl.; average, 19,700 bbl.; and, minimum, 10,200 bbl. As has been noted, there are variations in the future productions of wells of the same initial capacities. For the 20-bbl. wells in the Osage, the deviation from the average may be as much as 35% toward the minimum or 60% toward the maximum. These variations are caused by the differences in the rates of decline of wells of the same size and of different sizes. A well having a rapid decline-rate will produce ultimately much less than a well of the same initial output with a slow decline-rate.

In the practical application of the appraisal curve, the user may possess a property either fully or partly drilled. If the property is completely developed, the future production can be estimated from the average production per well, but if the property is partly developed, the future production of the undrilled wells must be estimated as well as that of the producing wells. To determine whether the undrilled portion of the property is oil-bearing is a problem in petroleum geology, and includes the questions of determining the number of productive wells that the undrilled portion of the property will support and whether the underground conditions are similar to those of the developed portion of the property. In addition, an estimate must be made of the probable effect of the producing wells on the new wells, which effect is influenced by natural conditions, spacing of the wells, and the length of time the older wells have been producing. After considering the weight to be attached to each of these factors, the person making the estimate must decide how productive, compared to the developed part, the undrilled part of the property will probably be. In reaching this decision, estimates of the ultimate productions of the producing wells will be of assistance in determining the recoverable oil per acre. In the same way, a knowledge of the acreage recoveries of oil from other properties in the same district will aid in estimating the probable oil recoveries per acre from the undrilled part of the property.

In platting such curves as those in Fig. 3 and 4, judgment must be used in selecting and applying the records, for there are sources of error and confusion that must be avoided so far as possible, or else allowances made for them. With care and study, this can be done, for, with the many records used, the errors tend to compensate each other.

A source of error that will not occur if records of individual wells are available, or if all wells are drilled at approximately the same time, is that later wells retard the average rate of decline of all the wells by their initial 'flush' productions. There is a tendency, however, for initial production of new wells near old wells to become constantly smaller on account of well interference, as the property grows older, so that the new wells drop into the general average soon after completion. The consecutive yearly decrease in initial production of several properties is a feature of the development of every oilfield. The abandonment of wells of small output on a property will also tend to maintain the average production per well. In the later life of a property this occasionally has a noticeable effect on the production curve.

A compensating source of error in the later life of a property is the assumed economic limit of production. On account of the increase in the price of oil, this assumed limit may prove too high, and it may be possible to pump the wells profitably with a smaller production. For wells of large initial yield, this additional production will be so small compared to the total that the error in percentages of the first year's production is negligible, but for wells of small initial yield the error in cumulative percentage may be of considerable importance. As has been shown, the cumulative percentage compared to the first year's production varies inversely with the initial

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

yearly output of the well. The cumulative percentage of a 2-bbl. well in the Osage may be as much as 700% when the well is considered unprofitable after it reaches a daily production of 1 bbl. If the lower limit were 0.1 bbl., the cumulative percentage would be much greater. Other sources of error are included in the alterable factors of recovery, to which attention has been previously directed. These may, during the lives of the wells, cause changes in the total recoveries and in the decline-curves. Among such alterable conditions are new wells, manner of operation, economic minimum of production, stimulation by compressed air, 'shooting,' vacuum-pumps, etc. In most cases, these changes will increase the ultimate production as well as the rate at

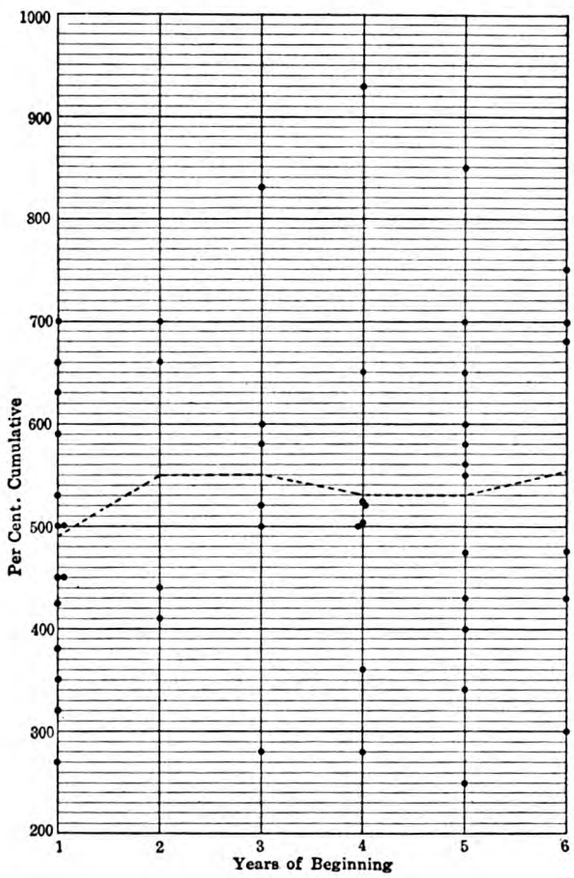


FIG. 5. CUMULATIVE-PERCENTAGE CURVE FOR WELLS WITH SMALL PRODUCTIONS

which the oil is obtained. The estimator cannot foretell what changes will be made nor the precise effects they will have. Our experience, however, leads us to believe that in general the changes are smaller than is commonly supposed, except for wells which have reached very small productions.

The use of Fig. 3 and 4 is based on the average daily production per well on a property the first year. It is obvious that it would be advantageous to use the most recent year's production as the basis of estimation, regardless of the age of the wells, but the curves could not be so used unless the future production of wells of equal output on the average was approximately the same.

To determine the relation existing between the future productions of wells of equal output but of different ages, Fig. 5 was constructed for wells producing 2 to 7 bbl. daily. The cumulative percentages of wells that made 2 to 7 bbl. daily during their initial year were platted along the first line, the cumulative percentages of 2 to 7 bbl. wells two years old along the second line, etc. It will be seen that the dots representing the different wells form in bunches not far from the average line, which is approximately horizontal. The fact that the dotted line representing the average is nearly horizontal indicates that the future production of wells making 2 to 7 bbl. was practically the same regardless of the ages of the wells. The trend of the average line is slightly upward, but this increase in cumulative percentages is so slight as to be practically negligible. In fact, if the first year were omitted, the average line would be nearly horizontal. Probably the low-average cumulative percentage of the first year is the result of lack of data. If several hundred properties were platted in this manner, the line might be more nearly horizontal. There is reason to believe that this relation will hold for large as well as for small wells. In fact, this is indicated in Fig. 6.

The conclusion that wells of equal output produce equal amounts of oil in the future, regardless of the ages of the wells, was reached by both of us independently by the use of different methods. Although contrary to popular belief and the prevalent ideas on settled productions, the proof seems sufficient. This appears to be confirmed by Fig. 6, which demonstrates within practical limits that, after 'settled production' is established in a given area, the production of any other well drilled in the area will be equal to the average production of adjacent wells and will decline at the same rate. This simplifies the problem of estimating future productions, for the usefulness of the appraisal curves in Fig. 3 and 4 is extended because the latest years' production can be used instead of the production for the first year. Also, the fact that wells of the same output have the same future production, regardless of age, provides a basis for estimating the production for each year of the future until the property is exhausted.

It must be remembered that these conclusions hold true only for average wells. Oil-men can cite many instances that might seem to prove these conclusions to be in error. However, if all wells of ordinary declines are considered, this will be found to hold true, especially in the Oklahoma fields. We are not prepared to state that the conclusions will prove absolutely true in fields where the underground conditions are radically different, such as the Californian fields, where enormous gas pressures exist, the productive horizons are thick, and the oil-sand is of an unconsolidated character through which channels must be made by the expelled oil before the well reaches its highest production. It may take several months or even two or three years for these channels to become cleared completely and for the well to reach its maximum daily production. If a well is deepened, or sometimes when it is cleaned, or even if the equip-

Generated on 2024-09-30 01:42 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ment on the well is changed, the problem becomes different, and the well will decline along a different curve. The theoretical explanation given in succeeding paragraphs, however, if proved true in practice, indicates that this fact of equal future production will prove to be universally true for large and small wells alike.

From the above conclusions, it becomes possible to derive the future annual production of a well, the well's generalized decline-curve and the life of the well. For example, a well in the Osage Reservation, producing 110 bbl. daily, or about 40,000 bbl. during its first year, according to Fig. 3, has an estimated total production of 87,000 bbl. and hence a future production of 47,000 bbl. Reversing the process and reading from 47,000 bbl. on the right margin of Fig. 3 to the left where the average total production curve is intersected, we find that a well with a future production of 47,000 bbl. must, the first year, produce on the average about 15,300 bbl. This amount deducted from 47,000 bbl. leaves a future of 31,700 bbl. which in turn is the ultimate production of a well producing about 8800 bbl. the first year, and so on.

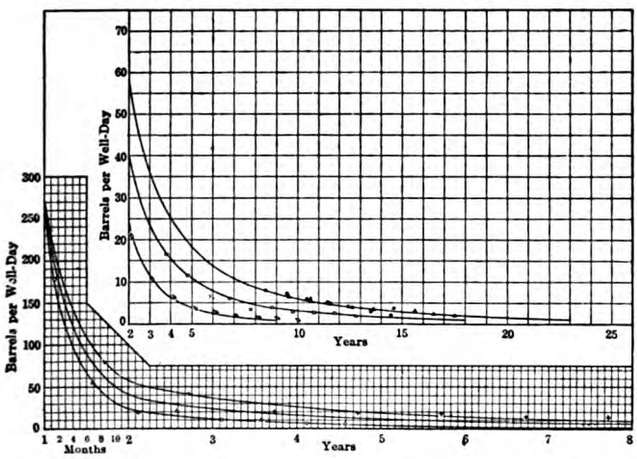


FIG. 6. PRODUCTION-CURVES FOR WELLS ON OSAGE RESERVATION

These calculations may be continued until the original 87,000 bbl. is extinguished, which should occur at the time the estimated production has declined to 1 bbl. per well-day, the assumed minimum daily production to which Osage wells can be profitably pumped. The yearly production of the generalized production curve thus derived reads 40,000, 15,300, and 8800 bbl. for the first three years, respectively.

Fig. 6 represents the maximum, average, and minimum types of production curves for oil wells in the eastern part of the Osage Reservation. These curves were derived from Fig. 3 by computing for the largest wells recorded, the generalized maximum, average, and minimum production curves from the total production curve on Fig. 3 in the manner just described. Wells whose production curves follow along or near the minimum curve (Fig. 6) are wells with sharp declines and small cumulative percentages, whereas production curves of wells following the maximum curve are of the opposite character. Production curves of other wells would be intermediate, but, regardless of the amounts of their production, should follow systematically within the extremes in similar positions.

To estimate the decline for a well or a group of wells, the first year's production may be platted on the average-decline curve (Fig. 6) at its intersection with the line indicating that production, disregarding the time periods. The annual productions for each of the following years are then platted at intervals representing time periods of one year each. If the later points deviate from the average-decline curve, the well is not an average well. If continued for a number of years, its curve will diverge from the average and tend to follow or to run parallel to the type of curve to which it belongs. The point of beginning may be shifted from the average curve till the record lies symmetrically between the average and one extreme. This may be found more conveniently by platting the record on transparent paper and superposing it over the generalized type-curves.

It is to be noted that wells of entirely different initial sizes may follow curves of the same type and that the curve of a small well may be overlapped by the end of the curve of a large well. This is the logical conclusion to be derived from the proof submitted in Fig. 5, that wells of equal output on the average have practically the same future production regardless of their ages. All properties on the minimum curves of Fig. 3 tend to follow the generalized minimum decline-curve of Fig. 6. The other properties take positions on the other generalized curves similar to those indicated by their cumulative percentages in Fig. 3.

As has been mentioned already, the production of wells varies from the ideal curves because of the many ways in which changing conditions may affect the production of the wells. Some Osage curves showed greater variations than those platted in Fig. 6, but all indicated a marked inclination to approach the ideal curve they were following. These variations are not without cause. If all the facts regarding the wells were available, reasons for many deviations from the generalized curves could doubtless be found. Study of the effect on production of various factors influencing wells, by observing deviations from the generalized curves, offers a promising field for investigation. It would not only aid in forecasting future productions, but would also help the producers to judge the efficiency of his production methods.

While the methods outlined above have proved useful in estimating future productions, other methods are desirable that will define more closely the probabilities of wells, at earlier periods in their lives and with fewer data. The variations in the ultimate production of wells of equal initial output are not without cause, and systematic study should make estimates more accurate. Moreover, closer study may permit the use of curves derived from the data of one field to be applied with more confidence to another field newly developed. The differences between the curves derived from wells of the Osage Reservation and those from the Nowata field have

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

been noted. In the latter field, some of the conditions, such as original gas-pressure, were more uniform. Hence the narrower limits, and the greater accuracy with which the future productions could be forecasted, were not unexpected. Comparisons of fields and properties in relation to such factors as gas-pressure should result in providing bases for estimating the comparative effect of gas-pressure and other influences. The appraisal curves for the Osage district and for the Nowata field were derived by platting the total production of individual wells against their production for the first year. Some of the other factors against which the total productions could be platted are gas-pressure, thickness of oil-sands, character of oil-sands, and quality of oil. These are all natural conditions, but, in addition, the spacing of wells, 'shooting,' perforations, manner of operation, use of stimulating methods such as gas-pumping, etc., could be profitably studied. Upon assembling sufficient data, it might be found that a 20-bbl. well of a certain gas-pressure in the Osage would nearly always be above the average or if the wells were spaced a certain distance apart, the tendency would be above or below the average for wells of that size. It will doubtless be found that while some factors are of much importance others are only of slight influence and may be neglected. However, the trend of the production curve is determined by the composite influences of several factors rather than that of one. Some of these factors may be found to be of importance, but are so seldom recorded that they will be of little use in practice. Study will not only determine values for the various factors, but will also indicate what records should be kept by the producer.

It may be contended that natural vagaries of the wells, water troubles, economic conditions, changes in the manner of operation, etc., are things which cannot be forecasted, thus making attempts at close estimates hopeless. It is our opinion, based on study and experience, that the behavior of wells throughout their lives is more intimately controlled by conditions established early in the life of the wells than has been supposed, and that careful systematic study will disclose methods permitting close estimates. All uncertainty, of course, can never be eliminated, nor can really accurate calculations be made on account of minor unforeseen influences and occasional conditions arising which cut short the life of a well. Furthermore, there is always the possibility that the development of methods for increasing the recovery of oil, such as the Smith-Dunn compressed air process, may radically change the quantity of oil recovered from a property.

In the study of production curves and in the development of the methods discussed in this paper, logarithmic co-ordinate paper, such as is used in Fig. 7, has been found to be particularly useful. We believe that it will prove to be useful in studying production-curve problems. On logarithmic paper, it is possible to reduce many curves to straight lines. Many production records of individual wells and many composite production curves from different parts of the country can be made to approach straight lines when platted on logarithmic paper. For example, Fig. 7 represents the decline in the average production per well on 34 properties in a West Virginian field. Apparently the general tendency is for production curves to approach straight lines with slopes differing in accordance with the particular type of curve. The advantage of being able to curve to a straight line is obvious, since its projection becomes simpler and more accurate. Moreover, in the later life of the well, when production becomes small compared

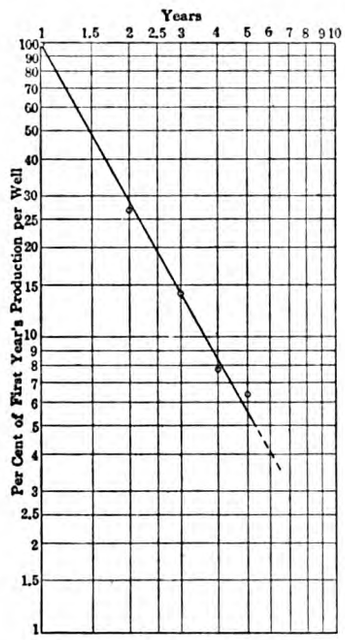


FIG. 7. PRODUCTION-CURVE FOR WEST VIRGINIA WELLS, PLATTED ON LOGARITHMIC PAPER

to the earlier production, the curve is projected on the logarithmic paper into an area where the scale is larger and hence more easily read. The effect of various factors on the production curve can also be traced more clearly as they deviate from a straight line. From logarithmic paper, many short cuts can be figured and it becomes possible to reduce the curves to their equations more readily, if this is desired.

LONG-LIVED BOND ISSUES FOR SHORT-LIVED IMPROVEMENTS

The danger of issuing long-term bonds for a relatively short-lived improvement was shown at a recent convention of the League of California Municipalities by D. W. Perry, of San Anselmo. The streets and highways of that municipality were constructed of macadam about 1910. Three bond issues, amounting in all to $70,000, were voted for this work. The bonds run for 30 and 32 years. Although $31,500 has been spent on maintenance and watering during the past seven years, the roads are nearly worn out, and will be entirely so in three or four years more, which will be about twenty years before all the bonds have matured.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Preventable Waste of Fuel*

By DAVID M. MYERS

The preventable waste of fuel in the boiler-room of one steel mill amounted to 40,000 tons of coal per year. This was a comparatively modern plant. The efficiency of boilers and furnaces in a 14-day test was 55%. The load factor was unusually favorable to high efficiency, which could have been raised easily to 70% or more. This is only one example. In one hand-fired plant the evaporation was raised from 6 lb. to 9 lb. of water per pound of coal after a few days instruction, and was continuously kept close to this higher mark with the help of coal and water measurements which were commenced.

Saving or wasting one-fourth of the coal consumption of any industrial plant depends entirely upon the efficiency of its operating management. This saving could be made in the boiler-plants alone, without considering the large economies possible in connection with its distribution and use.

Under present conditions a plant that is operated carelessly at an efficiency of 40 to 50% receives from the Government the same consideration in the delivery of coal as the one whose efficiency is 70 to 75%. This obviously is unfair as well as wasteful. The Government delivers, say, 200,000 tons of coal per year to a plant-owner, but does not ask for an accounting of consumption, or for any statement of the amount of steam produced.

The object of this paper is to open a discussion that will lead to formulating definite recommendations of methods for the reduction of the great preventable waste of fuel in our industries, with special reference to the elimination of the part of the present waste that is the result of faulty, careless, and uninformed operation of boiler-plants. Such recommendations should be forwarded to the proper authorities as an official communication of this Society, and the services of the Society should be offered to the Government for the organization and execution of any plans that may be adopted.

In general, there are two plans of operation worthy of consideration. One might be termed the autocratic method. This would involve the use of authority to compel coal-consumers to take such measures for economy as the proper authorities might prescribe, with limits as to the expense to the user. Such limits might be expressed as a proportion of the present yearly coal-bill. Many objections would probably be made by consumers to this plan, but, if it was made effective, the majority would realize its pecuniary advantage to themselves. Nevertheless, this plan may be too strongly opposed to democratic principles.

The other plan would be largely an educational one, in which patriotism and efficiency would furnish the motive forces required. The teaching must be accomplished with the utmost simplicity and directness. Above all, it must be in such form as to be readily comprehended and applied. This is a big task, but with the technical and executive ability represented in this Society, these things should be and can be accomplished.

The requisite information should be sent to the owners and managers of industries, and, in addition, simple instruction-sheets should be issued for the engineers and firemen. The importance of accurate daily records of coal and water must be taught, and information given regarding practical appliances for automatic measurements of both.

Blank forms might be sent in advance to plant-owners on which they could state, first, whether they would be willing to co-operate with a government organization offering to assist them in reducing their coal consumption, and second, to obtain the necessary data as to size, type, equipment, operation, and fuel-consumption of the plants.

The work of instruction could be facilitated by a staff of experts ready to visit plants when so requested by owners and to make investigations and recommendations and keep in touch with the progress of economies. Included in such a staff should be men familiar with practical operating economies to deliver lectures, which should be planned so as to reach not only managers and owners of the industries, but also the engineers and firemen of the boiler-plants.

The U. S. Bureau of Mines has for a number of years engaged in obtaining and disseminating scientific information regarding the mining and consumption of coal. The results of the work have been of great value to technical engineers who are able to use and apply it. It is evident that we now require an extension of the idea of education, but in such form as directly to affect the men who run the boiler-plants of our country, for in their hands is the saving or wasting of one-fourth of our fuel supply.

Six hundred million tons of coal were mined in the United States in 1916. If we assume only one-half of this to have been used for our industrial boiler plants, then one-fourth of the coal used under boilers amounts to 75,000,000 tons per year.

*Presented at the annual meeting of the American Society of Mechanical Engineers, December 1917.

A well 1080 ft. deep was recently drilled near Cloverport, Kentucky, without striking either oil, gas, or water. This is said to be the deepest well of its kind ever drilled.

Generated on 2024-09-30 01:39 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Pig-Iron From Scrap-Steel

The electric furnace has made possible what may be regarded as almost a revolution in the steel industry. It is the conversion of scrap-steel or iron back into pig-iron. What may be called 'synthetic pig-iron' is now a commercial product; in other words, the original constituents of pig-iron are being made to re-unite in the condition originally assumed. This unusual achievement is another evidence of the adaptability of electrical energy to the production of results impossible by any other means. The new process is being applied commercially in a large electric-steel plant in the eastern part of the United States, high-grade or low-phosphorus pig-iron being made directly from ordinary scrap-steel. Not only is pig-iron being produced in large quantities, but wash-metal and iron and steel-castings are made in the same furnaces. The pig-iron sells in the open market as a competitor with regular low-phosphorus blast-furnace iron, the wash-metal goes to crucible-steel makers, and the iron-castings are sold to near-by users, or else are used by the company in its rolling mill.

The idea is not new, but this is the first record of its commercial exploitation in the United States. Late in 1912, Horace W. Lash, of the Garrett-Cromwell Engineering Co., of Cleveland, organized a corporation for the purpose of converting scrap-steel and iron into pig-iron in an electric furnace on the Pacific Coast. Pig-iron being expenisve in that part of the country, and the fact that it could be made by this process without the use of coke, charcoal, or coal, which are not cheaply available there, were the impelling reasons. It is not known that the company carried out its plans, but it is understood that Robert Trumbull, an engineer at one time identified with Heroult in his efforts to introduce his electric furnace in America, is now producing pig-iron from scrap in an electric furnace in Canada.

The Eastern concern that has been successfully operating, as stated above, is known as the Sweetser-Bainbridge Metal Alloy Corporation of Watervliet, New York. For several months it has been producing from a Ludlum electric furnace. About 50 tons per day is the present output from two 5-ton furnaces.

There is no secret about the process. It is made possible by the unusual metallurgical feats which the electric furnace can perform. The actual method used by the company is not revealed. In general, however, ordinary scrap-steel of any grade is introduced into the furnace cold. The process is basic. The material is melted and refined if necessary, depending on the quality of the scrap and the degree of refinement desired in the product. These considerations also influence the cost. After the desired refinement is reached, the slag is removed. The necessary amount of ferro-silicon and ferro-manganese is added to bring the iron to the composition desired and then the carbon is added in the form of fine coke and this is easily absorbed by the hot metal. Five or six 5-ton heats per day in each of two 5-ton furnaces are being regularly produced by the above or a similar process. There is no difficulty in its execution and no question as to the quality of the products. In respect to sulphur and phosphorus, they equal if they do not surpass any blast-furnace or cupola product, as shown by the analyses that follow. Regulation of the temperature or the composition is apparently simple, and a range from high-grade low-phosphorus iron and wash-metal down to the high-phosphorus foundry and other irons is claimed to be possible, and it probably is. The graphitic-carbon content is regulated by the introduction of varying percentages of silicon. The manganese can be made anything desired and the total carbon is not difficult to regulate. The amount of phosphorus and sulphur is readily placed at almost any required percentage, depending on the composition of the scrap charged and the degree of refinement before conversion into pig-iron or iron-castings.

The commercial possibilities of the new process are shown, so far as the composition of the products is concerned, by the following analyses made in ordinary operation:

Composition of Pig-Iron Made From Scrap-Steel

	Sample No. 1, %	Sample No. 2, %	Sample No. 3, %
Total carbon	3.60	3.73	3.38
Manganese	0.41	0.35	0.31
Silicon	1.77	1.52	0.15
Sulphur	0.007	0.008	0.028
Phosphorus	0.019	0.030	0.032

The average phosphorus-content of the iron so far made has averaged 0.023%. The graphitic carbon can be whatever is desired, or as high as 3.50%, depending on the silicon content.

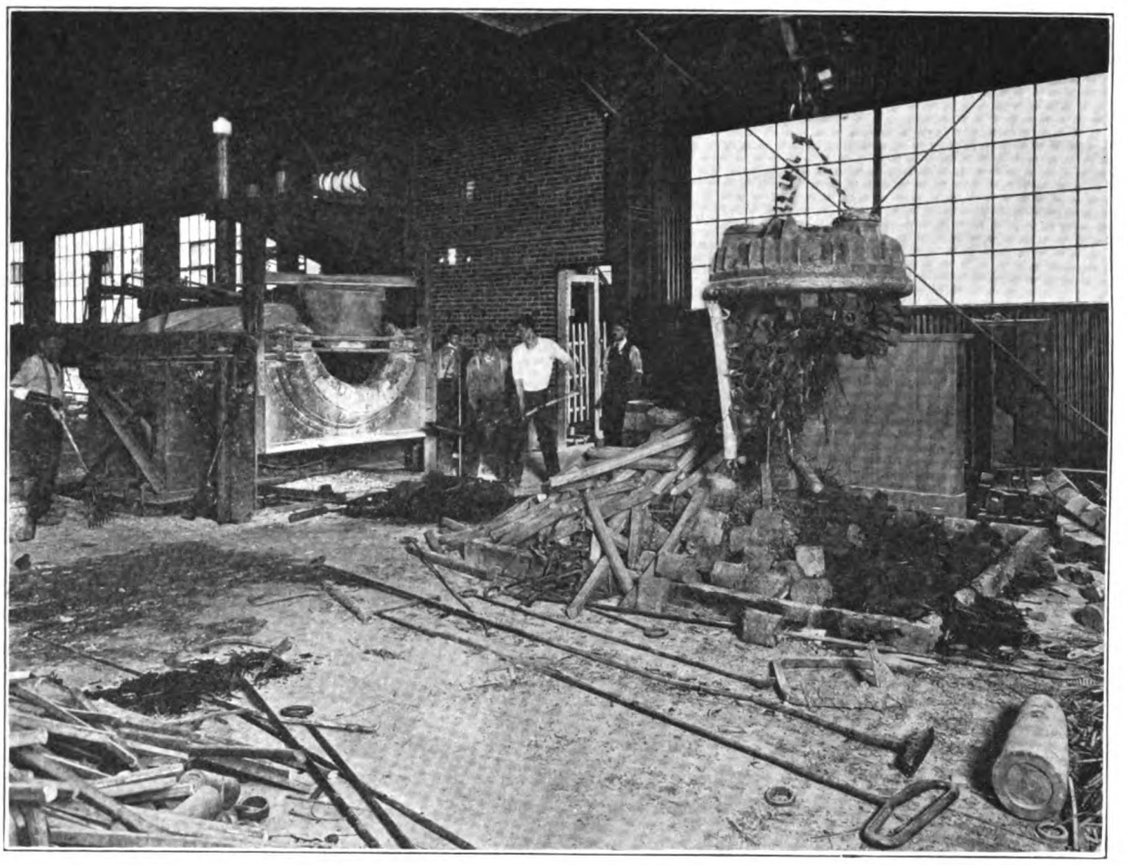
Composition of Wash-Metal Made From Scrap-Steel

	Sample No. 1, %	Sample No. 2, %
Total carbon	3.55	3.83
Graphitic carbon	none	none
Manganese	0.37	0.32
Silicon	0.20	0.14
Sulphur	0.020	0.012
Phosphorus	0.014	0.018

Composition of Cast-Iron Casings Made From Scrap-Steel

	Sample No. 1, %	Sample No. 2, %
Total carbon	3.36	3.63
Graphitic carbon	....	3.08
Manganese	0.36	0.31
Silicon	1.30	1.15
Sulphur	0.019	0.014
Phosphorus	0.024	0.018

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



AN ELECTRIC FURNACE ABOUT TO BE CHARGED WITH SCRAP-STEEL. A LIFTING-MAGNET IS DELIVERING THE SCRAP

PILES OF PIG-IRON MADE FROM SCRAP-STEEL AND THE MOLDS IN WHICH THE METAL RUNS FROM THE ELECTRIC FURNACE

Generated on 2024-09-30 01:45 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
UNIVERSITY OF ILLINOIS AT
URBANA-CHAMPAIGN

These analyses show how varied compositions can be controlled. The low-silicon content of the wash-metal permits the carbon to remain almost entirely in the combined state.

The pig-iron is reported to be very tough and strong. As to cast-iron in the form of castings, the experience of the Ludlum Steel Co. is cited. Cast-iron wobblers, for use in the company's rolling mill, which were purchased in the open market, were breaking at the rate of 10 to 12 per day. Wobblers from iron made in the electric furnace have been in use for two or three months without a case of breakage. The company also made the breaking-boxes on the mill of electric cast-iron. These should break easily when performing their normal function, but when made of this iron they were found to be entirely too tough, and their section had to be reduced considerably. It is believed that some explanation for these qualities may be found in the crystalline structure of the iron as well as in its greater purity compared with cupola-iron, this being contrary to cupola-practice, in which the sulphur rises with each re-melting in the electric process. In making steel castings the conversion loss is put at 5%. The cost of production is one of the vital points. So long as low-phosphorus pig-iron is selling at its present war price there can be no question as to the liberal profits obtainable. Whether in normal times such a method of making this grade or any other grade of pig-iron or castings is economically possible depends on several factors. First among these are the consumption of electricity and the grade of scrap used. If a relatively pure scrap-steel is the starting point, practically no refinement is necessary, and the kilowatt-hour consumption is at a minimum. The converse is true if poorer scrap, requiring more refinement, is used. The matter of other materials and the question of labor and electrode-charges are fairly constant in all cases. Owing to the fact that the Sweetser-Bainbridge Co. has been operating this process only for a short time and under rather imperfect conditions, actual data as to the cost of production are not available. Extensive experiments are being made to determine costs under various conditions and in various stages of the process, and these will be known in the near future. It is the estimate of the metallurgists of the company that the kilowatt-hour consumption of electricity per ton of pig-iron produced can be brought below 400 kw-hr. depending upon transformer-capacity, grade of scrap used, and the product desired. Electrode consumption and refractory renewals, it is said, are low, even under the prevailing abnormal costs of these materials. One melter and four men on each shift of eight hours are employed to operate the two furnaces, which, in 24 hours, are reported to produce 5 tons each, or 50 tons in all. With cheaper iron and steel-scrap in normal times it is claimed that the total cost would be lower.

The furnace in which the foregoing products are being made has come to be known as the Ludlum. Besides the two now making pig-iron, there are two 10-ton furnaces producing high-grade special and tool-steels in the new plant of the Ludlum Steel Co. This concern is a large producer of the new chromium permanent-magnet steel and it also makes chromium roller-bearing steels. There are two fields in which 'synthetic pig-iron' may play an important rôle. It is certainly practical and economical in districts where blast-furnace production is not possible as on the Pacific Coast. It is also likely that its purity and probably superior dynamic and static properties may make it a worthy competitor of charcoal-iron.

CORROSION OF BARBED WIRE

As a result of complaints of the short life of fence wire made by users, some 15 years ago, the U. S. Department of Agriculture made an investigation with a view to improving its resisting qualities. Notwithstanding this, there is continuous complaint of the short life of wire procurable today, as compared to some of the older brands of wire, much of which is still in service. A study of the analyses of a number of fence wires that have been in use for a number of years shows that those best resisting atmospheric influences generally contained greater or less quantities of copper, the rust-resisting quality of the wire increasing directly with the copper content. Much of the bessemer steel made 20 to 30 years ago contained copper, while that of more recent manufacture contains but a trace. The reason for this is that metallurgists have objected, and many still do object, to the presence of copper in structural steel, claiming that it makes the metal red-short, so, to meet this objection, care has been taken recently to eliminate copper from manufactured bessemer steel, hence its poor rust-resisting qualities.

The rate of corrosion of fence wire varies with the location. Not only do climatic conditions and the presence of industrial corrosive gases in the atmosphere influence the speed of corrosion but the position of the wire on the fence; whether it be the top or bottom strand, whether shaded, covered by bush, or next to a post or tree, plays a by no means inconsiderable part in the rate of its corrosion. The bottom wire on a fence generally will be found in a better state of preservation than a top wire, and wires shaded by trees and shrubbery, curiously, are less prone to rust than those in the open. All this makes it exceedingly difficult to obtain trustworthy data. The ideal condition for a corrosion test would seem to be in a strand of barbed wire, made by twisting together two wires of different composition, but even here there is the danger of an electrolytic action being set up which might act prejudicially on the wire that, under ordinary conditions, would be the most rust-resisting. Experiments are being conducted at a number of our universities with the view to finding an alloy, that, while not materially increasing the cost of the steel, will make it more resistant against atmospheric influences. Some success has already been attained and it is to be hoped that before long users of wire fences will be provided with a more satisfactory material.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Hoisting-Ropes

By M. H. SIGAFOOS

*Until recent years it was generally conceded that the foreign steels for the manufacture of wire-rope were by far the best, due principally to the fact that Swedish ores, considered the finest the world affords, are employed as their basic foundation. Such foreign steel as is imported by the American manufacturer for wire-rope purposes, is made to meet rigid specifications, insuring as nearly as possible a uniform quality, and is carefully tested and analyzed to insure correct percentages of manganese, silicon, and carbon, as well as the great necessity of their being extremely low in sulphur and phosphorus. Both of the latter elements are detrimental to the production of wire to be used in the manufacture of wire-ropes. Acid open-hearth steels are admitted to be better than basic open-hearth and it has been suggested that this is due to the higher oxygen content in the basic steel. Much has been claimed for the qualities of chemically treated steels, such as vanadium, chromium, and others, and in many instances they have proved the claims made for them, but for use in wire-rope they are still in the experimental stages, and no data are available at this time.

Wire made from steels intended for the manufacture of wire-rope for ordinary purposes is divided into three classes, namely: Iron, with a breaking-strain of approximately 80,000 lb. per sq. in.; cast-steel, often erroneously called crucible-cast, which has a breaking-strain of 170,000 to 180,000 lb. per sq. in.; and plough-steel, with a breaking-strain of 200,000 to 250,000 lb. per sq. in. Wire is often drawn to a considerably higher tonnage, but this is rarely used for any other purpose than for standing-rigging on racing-yachts, where maximum strength, with the lightest possible weight, is essential, such wires are sometimes drawn to 260,000 lb. per sq. in. Very small sizes of wire-rope or strands for aeroplane-guys are drawn to even a higher tonnage.

There has been much discussion on the point as to when a wire-rope has reached the end of its usefulness, and when it should be removed. Up to the present time it seems the question remains unanswered.

After an exhaustive investigation of the bending and load-stress, conducted by the Bureau of Standards, a report was published, as Bulletin No. 75, stating in substance, that a rope should be removed after a certain number of broken wires appear in each of the strands. The tables in the report undoubtedly have been compiled from stated loads, speeds, head-sheaves, and drum-diameters; from shafts of various depths, and, taking into consideration the torsional and load-stresses, they form a useful guide. However, as there is no standard of sheave and drum-diameters, except those recommended by rope manufacturers, nor any set rule for maximum loads, it is evident that with each variation in the diameter of sheaves or load, so will the bending-stress and the load-stress vary. Both of these stresses are of great importance and have a direct bearing on the factor of safety. In the catalogues of the wire-rope manufacturers are to be found the 'proper working-loads' of wire-ropes for the given sizes and grades. This, in almost all cases, is approximately 20%, or about one-fifth of the appromixate breaking-strength of the rope, and would appear to be a factor of safety of five. This, however, is not the case, as will be shown, and it is important, in calculating the proper rope for a certain load with a required factor of safety, that this proper working-load should not be confused with the actual factor of safety. While the working-loads do not show approximately one-fifth of the breaking strength of the ropes, it does not by any means indicate that in operation the rope selected would have a factor of safety of five, due to the fact that in addition to the working-load, there are other stresses to be considered, the most important of which is the stress due to bending over the sheaves and drums.

If the rope to be used is operated over standard-size sheaves and drums, the general average of bending-stress equals about 10% of the approximate breaking-strength of the rope. For instance, in a cast-steel wire-rope 1 in. diam., composed of 6 strands and 19 wires to the strand, the approximate breaking strength of which is 30 tons, showing a proper working-load of one-fifth, or six tons, to be used on a minimum size sheave or drum of four feet, the bending-stress would be 2.70 tons, or nearly $9\frac{1}{3}$%, of the approximate breaking-strength of the rope. It is thus evident, that, by adding this $9\frac{1}{3}$% to the load-stress, which is 20%, we have utilized $29\frac{1}{3}$ of the ultimate, and instead of an apparent factor of safety of five, we actually have only 3.41, or less than $3\frac{1}{2}$. This is still further reduced by the stress due to starting the load.

It is often impracticable to utilize the size of sheave or drum recommended by the manufacturer. In such cases the bending-stress will vary inversely as those diameters are greater or less. Assuming, in the above example, that two-foot diameter sheaves were used, the bending-stress would be 5.58 tons, or about $18\frac{2}{3}$% of the breaking-strain; this, in addition to the working load, would be $38\frac{2}{3}$% of the ultimate strength of the rope, reducing the factor of safety to 2.6. The total working-stress then would be greater than one-third of the ultimate breaking-strength of the rope when new and is not

*Abstract of paper read before the Mining Section of the National Safety Council.

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

considered good engineering practice. If sheaves twice the diameter of those recommended by the manufacturers, or 96 in., were used, the bending-stress would be only 1.4 tons or about 4¼% of the ultimate strength of the rope. By reducing the bending-stress to a minimum more economical service could be obtained, and in many cases a smaller diameter of rope could be applied, thereby increasing the efficiency of the rope, and promoting a saving in first cost.

Reverse-bends play an important part in the early let-down of a wire-rope. The underwind rope, in which there are reverse-bends, will invariably give a shorter service than the overwind rope. The difference in service of the two ropes varies, but from experience the overwind rope will give 10 to 25% more service. The underwind rope, as it comes off the head-sheave, has taken somewhat of a set, the permanence of which depends on the relation of the rope-diameter to the sheave-diameter; the smaller the sheave the greater the set. The rope now travels to the take-up drum, some distance away, and will wind in the opposite direction to that in which it came off the head-sheave; thus a reverse-bend is thrown into the rope, and, consequently, into the wires themselves. The rope cannot recover itself in most cases, for the set it received by the head-sheave is not entirely overcome before it strikes the take-up drum and consequently the effect of the latter bend is more severe.

Another cause for failure of wire-ropes can be attributed to repeated shocks. The effect of these overstrains, as they may be called, is shown by microscopic examination of the metal as leading to crystallization with a consequent embrittlement of the steel. The overlapping of the rope on the hoisting-drum, with occasional slipping of the top layer into the grooves made by the layer underneath, will, first, cause jerks which increase the load on the rope by an amount depending upon the slack between the drum and head-sheave, and, second, the inner series of wires will crush somewhat from the squeezing between the top and bottom layer and will assume a pear or bell-shape.

In this condition it is impossible for the inner wires to perform their proper function, and the outer wires will be forced to take more than their share of the stresses. They will assume the shape of their cushion, the inner series, causing trouble in the form of abrasion on themselves. Overlapping cannot be eliminated in most cases on account of the amount of rope that must be taken on the drum, but the point to emphasize is the fact that frequent inspection must be made in order to minimize accidents.

There are several methods of fastening ropes to the load, either by means of sockets or clips. Both of these can be made in such a manner as to break the rope before the connection gives out. In using sockets it was formerly thought necessary to turn in or bend back the strands or wires into the basket of the socket. This method is now replaced by opening the wires in the strand of the rope that is to be socketed, thoroughly cleaning them with muriatic acid cut down with zinc, and pouring molten spelter on the straight wires. Tests of this method of socketing have proved that a more uniform strain on each individual wire can be depended upon. It necessitates great care and there is no possible means of inspection. The connection made with clips, if properly applied, is equally strong, and careful inspection can always be made. This connection should be made with the U-bolt section of the clip over the short end of the rope. This insures greater safety, as there is no indentation on the main section of the rope by the U-bolt.

THE SCOTCH OIL-SHALE INDUSTRY

A report made to the U. S. Bureau of Foreign and Domestic Commerce by Thomas H. Bevan, U. S. Consul at Glasgow, Scotland, discusses the Scotch oil-shale industry. Most of the shale comes from a belt of land about six miles stretching from Dalmeny and Abercorn on the southern shore of the Firth of Forth as far as Tarbrax in the county of Lanark.

The Scotch shale is a fine black or brownish clay-shale. It is tough and resists weathering. The shale is broken in special machines and then subjected to destructive distillation in retorts. The products are as follows:

Shale spirit or naphtha, with a specific gravity from 0.66 to 0.75 at 60° F. These oils are used chiefly as solvents and for motor spirit.

Burning oils, with a specific gravity from 0.77 to 0.83, used for lamps and internal-combustion engines.

Gas or intermediate oils, specific gravity 0.84 to 0.865, used for gas making, gas enriching, fuel for the Navy, internal-combustion engines, and for cleaning.

Lubricating oils, specific gravity from 0.865 to 0.895.

Solid paraffin, melting-points from 100 to 130° F., used for making candles.

Still-coke and still-grease.

Still-gases for illuminating.

Sulphate for ammonia.

In 1916, 3,500,000 tons of shale was distilled, from which the following products were produced:

Motor spirit	660,000	gallons
Naphtha	4,840,000	"
Burning-oil	22,000,000	"
Gas or fuel oils	13,100,000	"
Lubricating oils	11,000,000	"
Paraffin	27,500	tons
Sulphate of ammonia	59,400	"

No costs of mining or refining are given, but the prices of the principal products were as follows: Burning-oil, $0.16 per gal. in 1912 and $0.36 per gal. in 1917. Gas-oil, $29.19 and $141.12 per ton. Refined paraffin, $0.04 and $0.13 per lb. Ammonium sulphate, $66.91 and $74.20 per ton.

Gas made from peat is being used to run a Diesel engine at Copenhagen.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Boiler Efficiencies With Various Types of Fuel*

By WILLIAM KENT

The following table shows the maximum theoretical efficiency obtainable for different kinds of fuel, assuming complete combustion with 20% excess air-supply and various rates of driving. W = pounds of water evaporated from and at 212° F. per hour, and S = square feet of heating surface.

	Efficiencies, Per Cent					
Values of W/S	Anthracite	Semi-bituminous	Pittsburgh bituminous	Illinois bituminous	Lignite	California fuel-oil
1	....81.85	80.41	79.78	78.28	75.83	78.78
2	....84.56	82.96	82.30	80.59	77.76	81.61
3	....84.71	83.00	82.34	80.44	77.51	82.01
4	....84.16	82.38	81.71	79.64	76.52	81.74
6	....82.39	80.42	79.76	77.34	73.98	80.52
8	....80.25	78.10	77.45	74.71	70.90	78.97
10	....77.95	75.64	75.01	71.93	67.79	77.26
12	....75.59	73.12	72.48	69.09	64.62	75.48
14	....73.19	70.54	69.92	66.20	61.40	73.58

The analysis of the fuels is as follows: Anthracite coal; carbon, 94.3%; hydrogen, 2.3%; oxygen, 2.4%; nitrogen, 1%; b.t.u. per pound, 15,000. Semi-bituminous coal; moisture, 1.7%; nitrogen, sulphur, and ash, 4.6%; carbon, 85%; hydrogen, 4.5%; oxygen, 3.2%; b.t.u., 14,950. Pittsburgh bituminous coal: moisture, 2%; carbon, 83%; hydrogen, 5.5%; oxygen, 8%; nitrogen, 1%; b.t.u., 14,908. Illinois bituminous coal: moisture, 10.8%; carbon, 61%; hydrogen, 4.2%; oxygen, 9.6%; nitrogen, 1.2%; ash and sulphur, 13.2%; b.t.u., 10,640. Lignite: moisture, 27%; carbon, 47.4%; hydrogen, 3.3%; oxygen, 12%; nitrogen, 1%; b.t.u., 8250. California fuel-oil: moisture, 0.2%; carbon, 84.9%; hydrogen, 11.9%; oxygen, 1.9%; sulphur, 1.1%; b.t.u., 19,000.

When the figures for efficiency given in the above table are platted, the resulting curves show a maximum at or near a rate of driving of 3 lb. of water evaporated per hour per square foot of heating surface, the evaporation falling rapidly to zero when the rate of driving is less than 1.5 lb. At higher rates than 3 lb., the curves approach straight lines. The following straight-line formulas for theoretical efficiency are correct within 1%:

Anthracite ..... $E = 84.7 - 1.05(W/S - 3)$
Semi-bituminous ..... $E = 83.0 - 1.13(W/S - 3)$
Pittsburgh bituminous ..... $E = 82.3 - 1.13(W/S - 3)$
Illinois bituminous ..... $E = 80.4 - 1.29(W/S - 3)$
Lignite ..... $E = 77.5 - 1.46(W/S - 3)$
California fuel-oil ..... $E = 82.0 - 0.77(W/S - 3)$

*From a paper presented at the second Pan-American Scientific Congress.

In computing the above efficiencies the following conditions are assumed: perfect combustion, no loss because of unburned hydro-carbon gases, or to leaks of air into the boiler-setting, or to moisture in the air, a clean boiler, gas-passages baffled so that short circuiting of the gases is prevented, and a moderate loss because of radiation ($2\frac{1}{2}$% of the heating value of the fuel when the boiler is driven at the 3-lb. rate and $1\frac{1}{4}$% at the 6-lb. rate). In the best modern practice, under the most favorable conditions, the efficiencies given in the table have almost been reached. A few tests with fuel-oil show slightly higher efficiencies. The best record yet obtained with coal is that of the best 10 out of 16 tests at the Delray station of the Detroit Edison Co., reported by D. S. Jacobus in the Transactions of the American Society of Mechanical Engineers for 1911. The formula, $E = 81 - 1.33(W/S - 3)$, represents approximately the results of these tests.

The reliability of these formulas has been established by platting the records of several hundred boiler-tests in which the analysis of gases has been given. The tests thus far studied do not indicate that there is any relation between boiler efficiency and the type or form of boiler, the diameter of the tubes, or the velocity of the gases. All types and proportions of boilers have given efficiencies that are close to the maximum, provided furnace and boiler conditions were favorable and the air-supply was regulated properly.

If the air-supply is excessive, a boiler cannot be driven at a rate exceeding 3 lb. of water evaporated per hour per square foot of heating surface without a rapid decrease of efficiency. On the other hand, when the air-supply is regulated so as to keep the oxygen in the chimney-gas between 3 and 6%, or the excess air at about 20%, a boiler can be driven at as high a rate as 14 lb. per hour per square foot of heating surface with a reduction of efficiency of less than 1.5% for each pound of increase in the rate of driving.

Paper pipes for carrying water, oil, and gas are being used in Germany, according to the 'Literary Digest.' The tubes are made by rolling sheets of paper around a mandrel until the required thickness is obtained, solidifying by means of a suitable adhesive, and covering with a layer of a special coating. The sections of pipe have three or four times the strength of iron or steel to resist internal pressure, but the joints are not nearly as strong as the single pipes. The pipes have sufficient strength to resist external pressure to permit their being used underground, provided that they do not become soft.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Recommended Legislation Regarding Water-Power Development

A special committee of the Chamber of Commerce of the United States has just reported on needed Federal legislation regarding water-power development. This committee was composed of L. S. Gillette, manufacturer, Minneapolis, chairman; H. A. Black, merchant, Galveston; Rome G. Brown, lawyer, Minneapolis; Henry S. Drinker, president Lehigh University; Frank P. Glass, editor, Birmingham; E. K. Hall, lawyer, New York; Horace C. Henry, contractor, Seattle; Henry L. McCune, lawyer, Kansas City; Samuel V. Stewart, Governor of Montana; George F. Swain, president Massachusetts Institute of Technology; and C. F. Weed, lawyer, Boston. This committee adopted a report, which was approved by all members of the committee except Mr. Stewart. The recommendations contained in the report have been submitted by letter-ballot to the various commercial organizations that compose the Chamber of Commerce. The recommendations are as follows:

1. "That Federal legislation encouraging the development of water powers should be at once enacted.

2. "As to all developments, whether within or outside the public domain, a separate act of Congress should not as at present be required for each development, but the authority to issue permits should be vested in some department or commission designated for that purpose and under conditions protective of the interest of the public and of the investor.

3. "Permits should be issued for a period of at least 50 years, unless at the option of the applicant a shorter period is agreed upon, and should be irrevocable except for cause.

4. "A toll should be imposed by the Government only on power developments on the public domain or benefited by head-water improvements maintained by the Government. Such tolls should be based upon the horse-power actually developed, used, and sold. The tolls should be reasonable, and proportionate to the benefits actually derived.

5. "If public lands form only a small and incidental part of the entire development, the licensee should be entitled to acquire the right to use such lands, paying the Government fair and just compensation for such use.

6. "At the expiration of the license period the Government should have the right to re-capture the property for itself or for a new licensee upon the payment of fair and just compensation for the property and for all dependent property, if taken; and if the dependent property is not taken, then fair and just compensation should be paid for all severance damages. Provision should be made that, all things being equal, the original licensee have priority over any new licensee.*

7. "At the expiration of the license period the Government should (1) agree with the licensee as to the terms of a new license, (2) re-capture for itself or for a new licensee, (3) continue the license under the original terms.

8. "Rates and service should be regulated by State commissions where the service is intrastate, and only by Federal authority where the service is interstate and the commissions of the States which are directly concerned do not agree or there is no State commission. The exercise of any Federal jurisdiction over the issuance of securities would be unnecessary and unwise.

9. "No preference should be allowed as between applicants, whether a municipality or otherwise, which amounts to the granting at the expense of the Government of a subsidy creating unequal competition in the same market."

Low boiler-pressures were the rule all over the world until comparatively recent years. In the flagship of the fleet commanded by Commodore Perry on his voyage to Japan in 1857, the boilers were of copper and were copper-stayed. The ordinary working-pressure was 12 lb. per square inch, and it was never allowed to exceed 15 lb. This was the best and most modern ship of the fleet. It ordinarily traveled under sail, steam-power being used only against unfavorable winds, or 'when an impression was to be made upon others than the crew.'

Cost of maintenance of the highways of Wayne county, Michigan, in 1916 was $23,393, or $7140 less than the cost during 1915. This saving is attributed to the replacement of several macadam roads by concrete pavement.

---

*"No element of the proposed legislation," comments the report at this point, "is more vitally important than the terms upon which the property of the permittee may be taken from him at the expiration of the permit. If he cannot be assured that in case his property is taken he will receive 'just compensation' therefor, he will invest his money in other enterprises. The words 'just compensation' carry an assurance of protection and fair dealing, and a sense of security. Any attempt to amplify or limit 'just compensation' by definitions and refinements of 'fair value,' 'original cost,' and other expressions upon which there are various theories now under discussion and as yet undefined by the courts, leads to uncertainty which is the one thing which must be avoided. All these mooted technicalities will be settled by the courts and the commissions long before any of these permits terminate. It is difficult to see why either the public or the investor should not be satisfied to rely upon the expression 'just compensation' and trust to its interpretation and application by the Federal courts in the light of public opinion as it shall be reflected in the law fifty years in the future."

Generated on 2024-09-30 01:36 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Engineers' Note Book

COST OF PIPE-LINES IN CALIFORNIAN OILFIELDS

The accompanying charts are taken from a paper presented by M. L. Requa at the St. Louis meeting of the American Institute of Mining Engineers, October 1917. The charts were prepared in connection with an appraisal made during 1914 and 1915 of the properties of the various companies in the

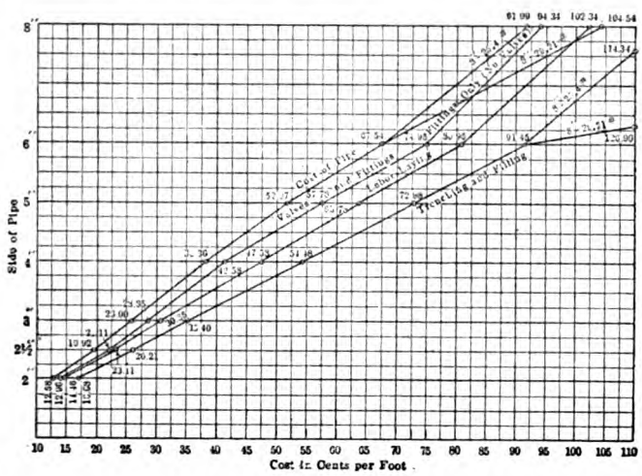


FIG. 1. COST OF 2-IN. TO 8-IN. PIPE-LINES

Independent Oil Producers' Agency. The committee in charge of this work was composed of M. L. Requa, chairman, M. V. McQuigg, R. S. Haseltine, and Thomas Cox, engineer.

To find the cost of, say, a 5-in. line, refer to Fig. 1. The

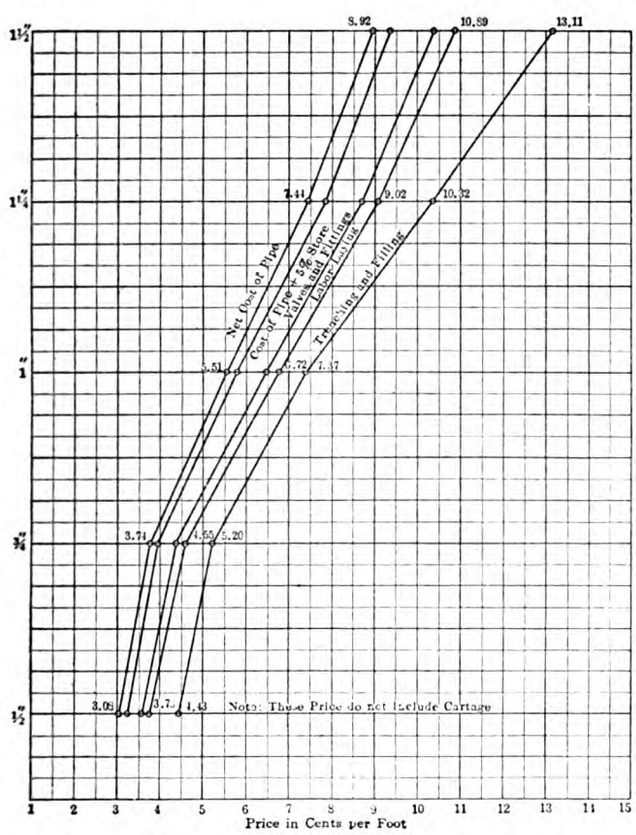


FIG. 2. COST OF SMALL STANDARD SCREW-PIPE LINES

cost of pipe alone is 52.07c. per ft. The cost of the average number of valves and fittings is 5.71c., making a total cost for pipe, valves, and fittings of 57.78c. per ft. The cost of laying is 6c., and of trenching and back-filling 9.20c. per ft., making a

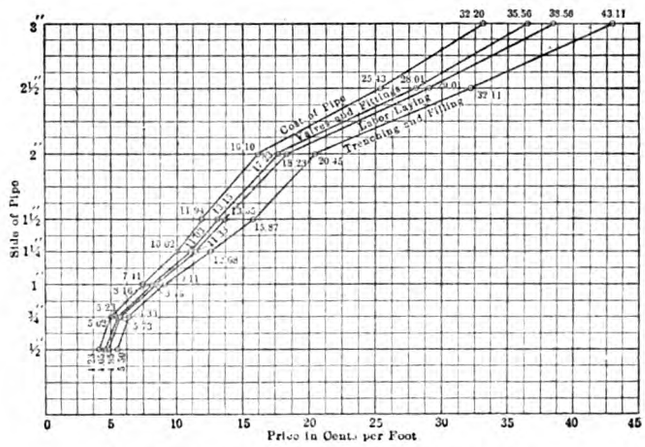


FIG. 3. COST OF GALVANIZED-IRON PIPE-LINES

total cost, exclusive of hauling, of 72.98c. per ft. Valves are not included for pipe larger than 6 in. diam., but should be estimated separately. Costs, exclusive of valves, for two sizes of 8-in. pipe are given. The cost of pipe given is based on pre-war prices and should be increased considerably at the present time. The cost of labor is also somewhat higher.

Industrial Progress

PIPE THAT WILL NOT BREAK

*The first of the accompanying pictures represents, not a section of rubber tubing or a piece of textile fabric, but a piece of steel pipe that has been subjected to the shock of some 40 gallons of nitro-glycerine exploded in an oil well. Only a few years ago the best steel pipe then obtainable would have been shattered to fragments by such an experience, but modern pipe is eminently 'punishable,' as the slang of the industry puts it. The case just mentioned is not unusual, we are told by a writer in 'Railway and Locomotive Engineering' (New York, October). A volume might be filled, he says, with similar ones, all going to show the great advance that has been made in the production of material of this kind. We read:

"Among the striking improvements in the manufacture of metals in recent years none is more remarkable than the advance that has been made in material for pipe. A few years ago it would have been impossible to obtain pipe that would withstand the unusual strains involved in present-day service. Some of the unusual experiences would scarcely be believed if they were not verified by a 'cloud of witnesses.' These incidents, while in a sense they may be unusual, are valuable as showing the progress made in metallurgical science, and are of interest to all who are concerned in the improvement of mechanical appliances. A volume might be made of these experiences, all showing the inherent qualities or 'punishability' of pipe, the result for the most part of unusual accidents. Indeed it would be impossible to duplicate the circumstances under which many of these unlooked-for tests occurred. In the illustrations, Fig. 1 shows a piece of $5\frac{3}{16}$-in.

*This article was printed as an article of general interest, and not as an advertisement, in the 'Literary Digest' for November 17, 1917.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

FIG. 1. A PIPE THAT CRUMPLED, BUT WOULD NOT BREAK, WHEN 40 GALLONS OF NITRO-GLYCERINE EXPLODED

steel casing that was originally about 18 ft. long, and was stuck in an oil well. About 170 quarts of nitro-glycerine had been placed in the well and was suddenly shot off with the idea of blowing this piece out, and at the same time 'shooting' the well. Instead of shooting it out, however, the casing was reduced in length from 18 to approximately 6 ft. It was drawn to the surface after great difficulty and was found to be crushed, twisted, and distorted, but no fracture was shown. The incident reproduced in Fig. 2 occurred when a string of 340 ft. of 10-in. oil-well casing fell 236 ft. when an elevator let go. The picture shows what happened to the lower length of pipe when the casing hit the bottom of the well. The thread protector was forced over the threads and up over the pipe approximately 12 or 13 in., and the pipe was bent backward and inward. As will be noted, however, the material shows no

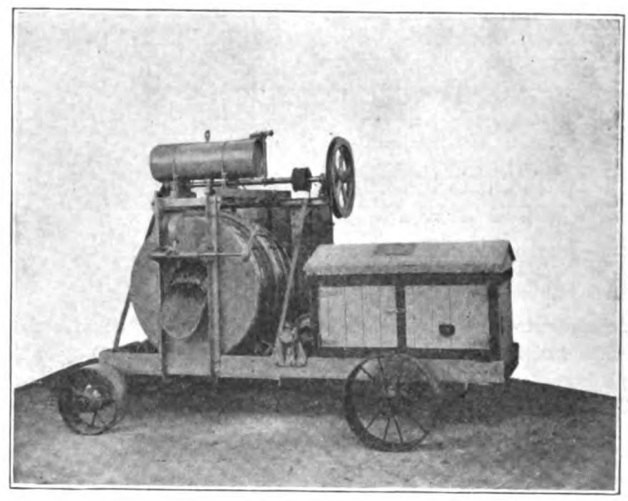
FIG. 2. THE END OF A HEAVY PIPE THAT FELL 236 FT. WITHOUT BREAKING.

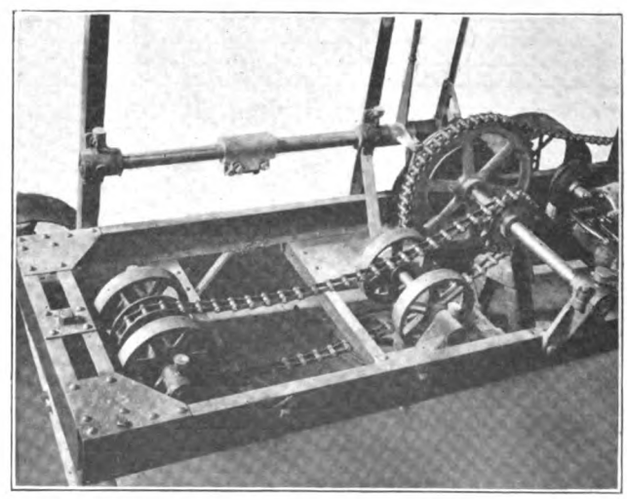
FIG. 3. THE THREE SECTIONS OF THIS CASING TELESCOPED WITHOUT CRACKING WHEN 34,000 LB. OF PIPE FELL 200 FEET.

fracture. This happened in the Oklahoma oil-field. Fig. 3 shows a '3 in 1' section of casing. There was a string 1440 ft. long of 8¼-in. steel casing; the elevator let go and the string of pipe, weighing something over 34,000 lb., dropped 2000 ft. to a bottom of limestone. The three sections on the bottom were telescoped, one inside and one outside. It will be seen that there was no failure in the weld, and the three lengths telescoped without a crack. The exterior apparently shows a straight length of casing. The particular piece here given was machined to show the three separate sections as telescoped. The circumstances are substantially the same as those in Fig. 2, but the results are different. This incident occurred in the Ohio field, and such experiences might be multiplied from numerous sources, as well as from files of the research department of the National Tube Company."

THE SMITH 7-S MIXER

Chain-drives on concrete-mixers where the chain goes around the drum have not been satisfactory. This is mainly because the chain stretches and becomes so loose as to come off the sprockets. To obviate this difficulty, the T. L. Smith Co., of Milwakee, has designed the Smith 7-S mixer, in which the chain, instead of going around the drum, runs under the truck-frame, around an idler-pulley on the roller-shaft, and back under the drum. The mixer-drum serves as an automatic tightener. The upward pull on the chain causes a good con-





MIXER EQUIPPED WITH POWER-LOADER AND NEAR VIEW OF CHAIN-DRIVE

tact between the chain and the sprocket-teeth. This upward pull reduces the wear on the rollers, roller-shafts, and boxes. The underslung drive also reduces the wear on the chain and on the sprocket-ring.

Another important feature of this mixer is a self-locking discharge-chute. In the ordinary mixer, the weight of the concrete falling on that part of the discharge-chute inside of the drum tends to 'flip' the chute. With the self-locking chute,

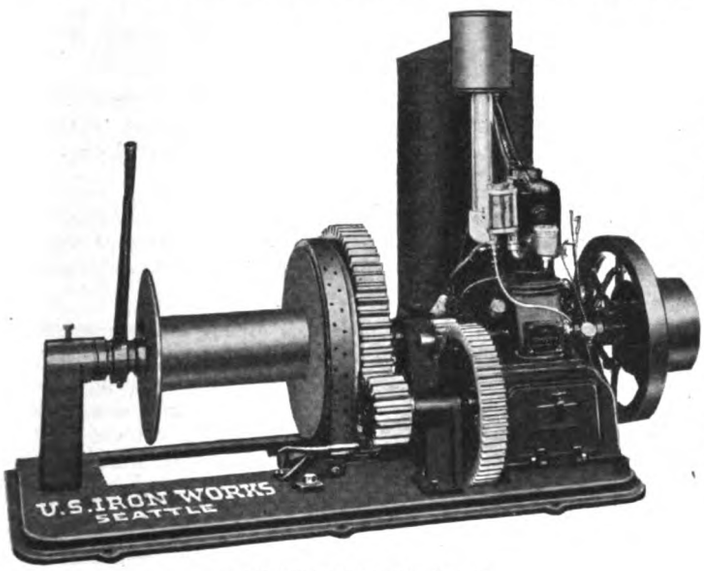
Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the toggles lock automatically as soon as the chute is inserted in the drum. No matter how much weight is thrown on the part of the chute that is inside the drum, the chute remains in position until moved by the operator.

The mixer may be equipped with either a steam or a gasoline engine and with either a low-charging platform or a power-charger.

DOWNIE DISTILLATE HOIST

This hoist operates on either distillate or kerosene, which can be purchased anywhere for about 10c. per gallon, and the fuel consumption is only ⅛ of a gallon per horse-power per hour. In other words, the 6-hp. hoist only consumes ¾ of a gallon per hour, which means 7½c. per hour to operate same. The 6-hp.



DOWNIE DISTILLATE HOIST

hoist will lift 1500 lb. at the rate of 100 ft. per minute, which, under average mine-hoisting conditions, means about 1c. per ton of ore hoisted for fuel per 100 ft. of shaft, allowing for dumping and return of bucket. This, of course, is so much cheaper than a horse-whim or any other method of hoisting that there is practically no comparison. There is only one attendant required for this hoist, the same as required on any hoisting apparatus; while a steam hoist requires a fireman in addition, and, as compared to cost, that of the distillate or kerosene is about one-tenth the cost of wood, and the saving is even greater when compared with an air-operated hoist. As compared with a hand-windlass, which requires two men, the saving would be so great that it would only take a few weeks to pay for a hoist of this kind. The hoist shown in the cut above is the straight line pattern and particularly adapted to mining work and is so arranged that the operator stands directly in front of the collar of the shaft when operating. There also are other patterns suitable for contractors, boat and fishery work, and general hoisting service in both the single and double drums. This hoist is simple in construction, easily operated, light, quickly taken apart for mule-back transportation, and very cheaply and quickly installed anywhere.

The design avoids the use of any gears, cams, valves, push-rods, trippers, valve-guides, springs, tappets, walking-beams, worm-gears, spiral-gears, and lever-arms, such as are included in the construction of other hoists. It does not require a mechanic to adjust it nor does it require a correspondence course or a teacher on gas engineering to understand how to run it. In simplicity of operation, and ease of control this hoist is ahead of the most complete and best-finished hoist ever built.

The ignition is jump-spark. The electric ignition is connected in such a manner that at the right moment an electrical contact is made, the electrical current passes up through the wire and down through the spark-plug, and just before the point of highest compression of the gas in the cylinder; the electric spark occurs in the very centre of this gas and air mixture. As standard equipment with each engine we furnish five Columbia No. 6 dry cells. This gives a force of 7½ volts to start with. This current then passes through a high-tension coil which transforms and intensifies it until it reaches 40,000 volts. It will not be hard, therefore, to realize why there is such perfect combustion; why every atom of gas is ignited and properly consumed in the production of power, and why there is no trouble from carbonizing in the cylinder. These machines are made by the U. S. Iron Works at Seattle, Washington.

NEW SHAPE-BOOK OF CARNEGIE STEEL COMPANY

The Carnegie Steel Co. has recently issued the sixth edition of its well-known 'Shape-Book,' containing 350 pages. Profiles, dimensions, and weights of nearly all the shapes rolled by the company are given. These include I-beams, H-beams, structural channels, ship-channels, bulb angles, bulb beams, angles, tees, zees, sheet-piling, reinforcing-steel, railroad rails, railroad cross-ties, track accessories, and many miscellaneous structural and other shapes. The book also contains a number of useful tables, and there is a complete index, arranged by section-numbers and also alphabetically.

Two other recent publications of the company are a 16-page pamphlet on structural steel for ships and another pamphlet of about the same size describing bulb-sections. Copies of all these publications may be obtained through the United States Steel Products Co., Rialto Bdg., San Francisco.

TRACTOR DEMONSTRATION AT DAVIS

A tractor demonstration will be held April 17-19 at the University of California farm at Davis under the auspices of the California Tractor and Implement Association. Tests of draw-bar pull and ability to make short turns on both plowed ground and ordinary surfaces will be conducted under the direction of J. B. Davidson of the University of California. Besides the tractors themselves, the various tractor-drawn tools will be exhibited. The use of the tractor as an all-round stationary power-plant will also be illustrated.

New Publications

TERRESTRIAL MAGNETISM, UNITED STATES MAGNETIC TABLES AND CHARTS FOR 1915. U. S. Coast and Geodetic Survey, Department of Commerce, Washington, D. C.

THE NEGLECTED WATERS OF THE PACIFIC COAST. By E. Lester Jones. Special Publication No. 48, Department of Commerce, U. S. Coast and Geodetic Survey. Pp. 21. Ill.

THE COLLAPSE OF SHORT THIN TUBES. By A. P. Carman. Pp. 38. Ill. Bulletin No. 99, Engineering Experiment Station, University of Illinois, Urbana, Ilinois. Describes a series of experiments made at the Station and gives a summary of other data on the subject.

THE California State Mining Bureau has published revised maps of some of the oilfields of the State. The Santa Maria field is shown on a map in two sheets, each 34 by 37 in., one showing Cat Canyon and Los Alamos and other the old Santa Maria field, Casmalia, and Lompoc. The scale of both sheets is 2000 ft. to 1 in. and the price of each sheet is $0.50. A map on the same scale of the Sargent field in Santa Clara county has also been completed. The price is $0.25.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Engineering Societies

IDAHO SOCIETY OF ENGINEERS. Ira F. Schaffner, secretary, Boise.

Los Angeles Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Ford W. Harris, secretary, 1029 Higgins building.

Los Angeles Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Edward Woodbury, secretary, 255 East 3rd street.

OREGON SOCIETY OF ENGINEERS. Orrin E. Stanley, secretary, room 409, City Hall, Portland.

Portland Section, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Paul Lebenbaum, secretary, 45 Union Depot.

Portland Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. J. A. Currey, secretary, 194 North 13th street, Portland.

San Francisco Section of AMERICAN SOCIETY OF CIVIL ENGINEERS. N. A. Bowers, secretary, Rialto building.

San Francisco Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Carl F. Braun, secretary, Hooker & Lent building

San Francisco Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. A. G. Jones, 811 Rialto building.

Southern California Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. Wilkie Woodard, secretary, 435 Consolidated Realty building, Los Angeles.

UTAH SOCIETY OF ENGINEERS. Hugh C. Lewis, secretary, Capitol building, Salt Lake City, Utah.

A meeting of the SAN FRANCISCO SECTION OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS was held February 28 at the Engineers' Club. The subject of the evening, 'Technical Features of the Interconnection of Electric Power Systems in California,' was discussed by P. M. Downing, G. S. Jacobs, J. E. Woodbridge, J. P. Jollyman, W. B. G. Euler, W. M. Shepard, and H. A. Barre.

The regular bi-monthly meeting of the SAN FRANCISCO ASSOCIATION OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS was held February 19 at the Palace Hotel. The report of the committee on the Status of the Engineer, which is summarized in another column, was presented. A committee composed of H. L. Haehl, A. H. Markwart, and W. F. Huber was appointed to investigate the question of the licensing of engineers and to draft, subject to the approval of the Association, a licensing law. This licensing law is not necessarily to be presented at the meeting of the California legislature next year, but, in any case, is to be ready for presentation if a bill similar to the architect's licensing law that was proposed and defeated at the last session is presented. The paper of the evening, on 'Construction Methods on the Humboldt Jetties, was presented by G. F. Whittemore.

Personal

J. H. SMITH, formerly State Engineer of Idaho, has resigned.

JAMES E. SELLERS, formerly of San Diego, is with the 23rd Engineers.

WILLIS POLK has gone to Washington to take one of the Government's $1-per-year positions.

C. E. HICKOK, city engineer of Alameda, California, has received a commission as Captain in the Engineer Officers' Reserve Corps.

T. A. O'DONNELL has been appointed to take charge of the petroleum production department under M. L. REQUA, Federal Oil Administrator.

GEORGE L. DILLMAN has been appointed aid on the staff of General W. L. BLACK, Chief of Engineers, U. S. Army, with headquarters at Washington, D. C.

QUINTON, CODE & HILL, of Los Angeles, have been appointed consulting engineers for the Santa Barbara municipal water-supply project, succeeding J. B. LIPPINCOTT, who resigned.

I. E. GOODNER, chief engineer for the Paradise, California, irrigation district, has been appointed assistant engineer on the Miami River flood-control project, with headquarters at Dayton, Ohio.

W. W. BRIGGS, formerly manager for the Great Western Power Co., has gone to New York to take an executive position with the Westinghouse Electric & Manufacturing Company.

HANS MUMM JR., formerly city engineer of Everett, Washington, and county engineer of Snohomish county, has resigned to become engineer for the Portland Cement Association, with headquarters at Spokane.

FRANK J. SILSBEE, formerly statistician for the Independent Oil Producers' Agency, and recently editor of the 'Pacific Petroleum Record,' has gone to Washington to assist in the work of Federal Oil Administration.

D. M. FOLSOM, professor of mining at Stanford University, has been appointed oil administrator for the States of California, Washington, Oregon, Idaho, Utah, Nevada, Arizona, and the Hawaiian islands and Alaska.

J. M. WADSWORTH, petroleum engineer for the U. S. Bureau of Mines, has been asked by the Pacific Coast Division of the U. S. Fuel Administration to act in an advisory capacity in preparing its plans for the conservation of fuel-oil by increasing the use of hydro-electric power. F. H. FOWLER, district engineer for the U. S. Forest Service, will also assist in this work.

R. K. WEST, formerly State highway engineer of Nevada, and before that on the engineering staff of the California State Highway Commission, has received a commission as Captain in the Engineer Corps, and will probably be attached to one of the highway regiments in France. C. C. COTTRELL, also formerly an engineer for the California State Highway Commission, has been appointed to succeed him as State highway engineer of Nevada.

Obituary

CHARLES D. SMITH, a pioneer surveyor and engineer of Visalia, died February 21 at Bakersfield, Califorfnia.

A. F. GILMORE, one of the largest independent oil producers in California, died February 15 at his home in Los Angeles.

A. L. BOSCHKE, who was connected with the construction of the harbor of Los Angeles, died February 6 at his home at Los Angeles.

AUGUSTINE W. WRIGHT died February 3 at his home at Los Angeles. Mr. Wright was one of the builders of the Union Pacific Railroad, and also was engineer for street-railroads in both Chicago and Los Angeles.

Commercial Paragraphs

BLAKE BROS., dealers in rock and gravel at Oakland, California, have opened an office at 705 Balboa Bdg., San Francisco.

At the annual meeting of the GENERAL CONTRACTORS' ASSOCIATION of San Francisco, the following officers were elected: president, Fred Lindgren; first vice-president, John Monk; second vice-president, A. H. Bergstrom; secretary, P. J. Cole; treasurer, Charles Wright.

Generated on 2024-09-30 01:45 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Construction News Summary

STREET AND ROAD WORK

BAKERSFIELD, CAL.—Board of Supervisors has decided against appropriating money for county's share of cost of construction of the state highway lateral between Famoso and Paso Robles until the Maricopa road has been completed. The Maricopa road was part of the original county highway system for which bonds were voted in 1913, but the money was exhausted before the Maricopa road and several other parts of the system could be completed.

BONNERS FERRY, IDA.—Bids will be received until March 8 by county clerk for construction of 14 miles of Panhandle highway in Boundary county. Plans from State Highway Engineer, Boise, Idaho. Separate bids will be received on grading, construction of bridges, and furnishing of culverts.

DALY CITY, CAL.—Federal Construction Co., Sharon Bdg., San Francisco, was only bidder at $203,838.45 for improvement of streets in the West End Homestead district.

EL SEGUNDO, CAL.—George R. Curtis, 2440 East 26th street, Los Angeles, was low bidder at $30,417.65 for grading and construction of asphalt-macadam pavement on several streets.

EUREKA, CAL.—Elsemere & Jacobs, Eureka, were low bidders at $9844 and were awarded the contract for grading Broadway between Clark and Fourth streets. Mercer-Fraser Co. bid $12,170.

LOS ANGELES, CAL.—Contract for improvement of Myra street has been awarded to E. Schelling, 4316 South Figueroa street, Los Angeles, for $6364.21.

Contract for grading and oiling Coleman avenue has been awarded to W. Liddington, 420 East 60th street, Los Angeles, for $2848.84.

City council has decided to extend Broadway from Pico to Washington street.

Contract for grading and paving Hope street has been awarded to George R. Curtis, 2440 East 26th street, Los Angeles, the only bidder, for $17,633.67.

Contract for grading and oiling Preston avenue has been awarded to E. Schelling, 4316 South Figueroa street, Los Angeles, for $5200.33.

Contract for grading and oiling Aldama street has been awarded to O. L. Stevens, 1933 Araphoe street, Los Angeles, for $3769.91.

MANTECA, CAL.—Formation of highway district to construct roads in this vicinity is proposed. Estimated cost of roads is $172,500, which would be provided by bond issue.

MODESTO, CAL.—Plans for road around the Woodward reservoir in place of the one that will be flooded when the reservoir is filled have been approved by Board of Supervisors. Work will be done by the South San Joaquin irrigation district. Estimated cost is $25,000.

MONTESANO, WASH.—Bids will be received until March 18 by W. D. Campbell, county auditor, for grading and graveling two miles of highway.

MT. VERNON, WASH.—Contract for construction of concrete pavement on Olympia Marsh-Riverside road has been awarded to R. M. Hardy, 2535 34th avenue South, Seattle, for $50,180.

Contract for construction of bitulithic pavement on Avon-Allen road has been awarded to Kaiser Paving Co., Everett, for $90,000.

OAKLAND, CAL.—Plans have been prepared for paving several streets in the industrial district south of 8th street and west of Washington street.

OROVILLE, CAL.—Contract for construction of Oroville-Palermo highway has been awarded to Brush-Howard Co., Santa Rosa, for $5000.

PORTERVILLE, CAL.—Plans for paving streets extending from main business district to connect with county highway system have been completed and call for bids will be issued soon. Pavement will have a 1½-in. warrenite surface on a 5-in. concrete base.

PORTLAND, ORE.—State Highway Commission has rejected all bids for construction of the Pendleton-Echo, the Echo-Morrow County line, and the Dillard-Briggs highway.

New work of State Highway Commission for this year will be confined to the Pacific highway.

RED BLUFF, CAL.—Bids will be received until March 12 by H. G. Kuhn, county clerk, for grading 1.82 miles of highway in road district No. 2.

REDDING, CAL.—Bids will be received until March 7 by S. N. Witherow, county clerk, for construction of road along McCloud river from point near U. S. Fishery Station, 17,600 feet.

RENO, NEV.—Municipal budget for year includes $20,000 for street improvements.

RICHMOND, CAL.—No bids were received for paving streets in the Canal subdivision.

RITZVILLE, WASH.—Contract for construction of 8½ miles of highway has been awarded to Henry Rosenoff, the low bidder, for $54,000.

RIVERSIDE, CAL.—Contract for construction of 5½ miles of concrete highway near Indio has been awarded to Johnson-Shea Co., Riverside, the only bidder, for $64,946.50.

Contract for construction of macadam highway between Thermal and Mecca has been awarded to Johnson-Shea Co., the only bidder, for $34,631.80.

SACRAMENTO, CAL.—Following were the unit prices named by F. Rolandi, San Francisco, who was the only bidder for construction of 15 miles of state highway in Lassen county between Susanville and Coppervale: excavation, $1.05 per cu. yd.; 12-in. corrugated pipe, $0.80 per ft.; 18-in. pipe, $1; 24-in. pipe, $1.30; concrete in culverts and monuments, $20 per cu. yd.; new property-fences, $300 per mile; moving and re-setting property-fences, $300 per mile; monuments, $1.50 each; a total of $81,027. Engineers' estimate was $66,827.08. State will furnish pipe-railing for culverts, reinforcing-steel, corrugated pipe, cement, and material for new fences, valued at $6950.20. Bid was rejected.

Maurice Ryan, Campo, was low bidder for construction of 2.7 miles of state highway in San Diego county near Sweetwater river at the following unit prices: excavation, $1.06 per cu. yd.; 18-in., 24-in., and 30-in. corrugated pipe, $1 per ft.; concrete in culverts and monuments, $20 per cu. yd.; dry-rubble masonry, $3 per cu. yd.; guard-rail, $0.50 per ft.; monuments, $1.50 each; a total of $64,449. Other bidders were Charles S. Soteras, Los Angeles, $67,795.40; A. L. McCray, Los Angeles, $72,969; W. M. Ledbetter, Los Angeles, $76,334.35. Engineers' estimate was $64,526.88. State will furnish reinforcing-steel, pipe-railing, corrugated pipe, and cement, valued at $4044.01.

Bids wil be received until March 18 by State Highway Commission for construction of three miles of concrete-paved state highway in Riverside county near Thermal. Work will require 8400 cu. yd. excavation, 78 ft. 18-in. corrugated pipe, 5 cu. yd. concrete in culverts, 2950 cu. yd. concrete in pavement, and 32 monuments. State will furnish reinforcing-steel, corrugated pipe, and cement.

Federal Construction Co., Sharon Bdg., San Francisco, was low bidder at $48,530.80 for paving 6.7 miles of state highway in Santa Cruz and a point three miles south of Glenwood. Engineers' estimate was $48,738.84.

SALINAS, CAL.—County surveyor H. F. Cozzens is preparing plans for widening the oil-macadam pavement on six miles of the Castroville-Watsonville road. Estimated cost is $40,000.

Contract for improvement of the Coast road from the Carmel river southerly has been awarded to N. R. Smith for $3600.

SAN BERNARDINO, CAL.—W. D. Bohan bid 10.25c. per sq. ft. and Highway Construction Co., 10.5c. for construction of concrete pavement with asphaltic surface on Second street. Bids were rejected.

Contract for construction of 4-in. concrete pavement on Catick street has been awarded to Phillips & LeClaire for $982.99.

SAN FRANCISCO, CAL.—Contract for improvement of Mariposa street between Potrero avenue and Utah street has been awarded to C. B. Eaton at the following unit prices: excavation, $1 per cu. yd.; brick pavement, $0.43 per sq. ft.; concrete sidewalks, $0.14 per square foot.

Contract for improvement of Detroit street between Hearst avenue and Flood avenue has been awarded to C. B. Eaton at the following unit prices: concrete curbs, $0.70 per ft.; brick catch-basins, $80 each; 10-in. vitrified culverts, $1 per ft.; 12-in. vitrified sewer, $2.50 per ft.; concrete sidewalks, $0.14 per sq. ft.; asphalt pavement, $0.23 per square foot.

Contract for improvement of Taraval street near 25th avenue has been awarded to State Improvement Co. at $0.98 per ft. for curbs and $0.29 per sq. ft. for asphalt pavement.

Contract for improvement of Taraval street near 35th avenue has been awarded to J. J. McHugh at $0.70 per ft. for concrete curbs, $0.12 per sq. ft. for concrete sidewalks, and $0.20 per sq. ft. for asphalt pavement.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Contract for improvement of Taraval street between 35th and 36th avenue has been awarded to State Improvement Co. at $0.94 per ft. for concrete curbs, $0.17 per sq. ft. for concrete sidewalks, and $0.29 per sq. ft. for asphalt pavement.

Western Pacific Railway has awarded contract for re-paving part of Brannan street with basalt blocks on concrete base to Fay Improvement Co. at $17.50 per 1000 for re-cutting blocks, $0.204 per sq. ft. for paving, $1.70 per ft. for sewers, and $47 each for catch-basins.

Contract for improvement of Kansas street between 22nd and 23rd streets has been awarded to H. Crummey, Inc., at the following unit prices: excavation, $0.65 per cu. yd.; brick catch-basins, $80 each; vitrified culverts, $1.50 per ft.; redressing and re-setting granite curbs, $0.25 per ft.; concrete curbs, $0.60 per ft.; brick pavement, $0.38 per sq. ft.; asphalt pavement, $0.175 per sq. ft.; concrete sidewalks, $0.11 per square foot.

SAN JOSE, CAL.—Contract for paving Market street between Santa Clara and San Fernando streets has been awarded to Bernard Ransome, Oakland, at 14.2c. per sq. ft. for pavement, and 22.3c. per sq. ft. for gutters.

SAN RAFAEL, CAL.—Contract for grading about three miles of highway between Bolinas and Olema has been awarded to S. P. Brownlee, Ross and Marin streets, San Rafael, for $7700.

SANTA ANA, CAL.—Plans have been completed for construction of 4-in. concrete pavement on Bristol street. Estimated cost is $14,000.

SANTA BARBARA, CAL.—City council has approved plans for paving Loma street.

SANTA CRUZ, CAL.—Contract for improvement of Chittenden Pass road has been awarded to George Foster, Chittenden, for $3753.56. Granite Rock Co. bid $4440 and Charles Rowe $4666.90.

SEATTLE, WASH.—Contract for grading Northlake avenue and other streets has been awarded to McGuire Bros., American Bank Bdg., Seattle, for $70,957.

SOUTH BEND, WASH.—Bids will be received until March 8 by county commissioners for construction of 4.1 miles of 8-ft. concrete pavement on the National Park highway.

ST. HELENS, ORE.—Bids will be received until March 8 by county clerk for construction of several highways.

STOCKTON, CAL.—Contract for construction of five miles of the Clements-Ione road has been awarded to McCleary & Gordon, Lodi, for $0.55 per cu. yd. for excavation, or $4400 in all. Laiblin & Co., Manteca, bid $0.75 per cu. yd., and W. Moreing the same amount.

Contract for construction of Thorne road has been awarded to McCleary & Gordon for $0.25 per cu. yd. for excavation, $2.37 per ton for rock, and $2.60 per ton for screenings. County will oil the road itself.

VALLEJO, CAL.—Private contract for paving one block on Indiana street has been awarded to Worswick Construction Co., Vallejo.

VENICE, CAL.—Contract for construction of 5-in. concrete pavement on Redondo drive has been awarded to Venice Contracting Co. at $0.22 per sq. ft., including grading, a total of $31,869.20. J. W. Braun bid $32,564.52.

VENTURA, CAL.—Bids will be received until March 5 by J. B. McCloskey, county clerk, for grading and construction of 28,000 sq. ft. of 4-in. concrete pavement on Main and Center streets in the town of Piru.

VISALIA, CAL.—Board of Supervisors has awarded the following contracts for county highway work:

Woodlake-Elderwood division to U. S. Caldwell, Sacramento, for $47,405.52.

Lindsay south division to J. S. Caldwell for $5029.50.

Tulare-Lindsay division to Shafer Construction Co. for $65,706.20.

These are all labor contracts, the county furnishing materials.

WASHINGTON, D. C.—Secretary of Agriculture has approved the following allotments of funds for highway building in National Forests under section 8 of the Federal Aid Road Act: Oregon, $132,796; Washington, $92,565; Alaska, $47,071.

WATERVILLE, WASH.—Bids will be received until March 8 by county commissioners for grading, draining, and macadamizing 1½ miles of permanent highway No. 4-A. Estimated cost is $12,000.

Bids will also be received until the same time for grading, draining, and surfacing with gravel or macadam four miles of highway near Bridgeport. Estimated cost is $18,238.

WENATCHEE, WASH.—Contract for construction of concrete pavement has been awarded to Clifton, Applegate & Toole, Spokane, for $26,977.

YUBA CITY, CAL.—Contract for paving several streets has been awarded to Federal Construction Co., Sharon Bdg., San Francisco, for $41,939. W. H. Paul bid $45,139, and Clark & Henery Construction Co. $45,742. Work includes 175,000 sq. ft. pavement, 1840 ft. of combined curb and gutter, and 32,500 cu. yd. grading.

YUMA, ARIZ.—No bids were received for paving Orange avenue.

SEWERS AND DRAINAGE

BOISE, IDA.—Bids will be received until March 16 by Snake River Canal Co., Idaho Bdg., Boise, for construction of drainage-ditches at Chattin Flat.

BOZEMAN, MONT.—Bids will be received until March 7 by C. A. Spieth, city clerk, for construction of 6-in. sewers on several streets.

GRASS VALLEY, CAL.—Contract for construction of sewer on Stewart street has been awarded to Thomas Horan for $300.

MARYSVILLE, CAL.—Contract for construction of sewers on several streets has been awarded to Peirano & Curry, Marysville.

SEATTLE, WASH.—Contract for construction of sewers on 22nd avenue, South-West and other streets has been awarded to Superior Construction Co. for $69,824.60.

YUBA CITY, CAL.—Contract for construction of septic tank at county hospital has been awarded to Barton & Hite, Sacramento.

BRIDGES AND CULVERTS

EL CENTRO, CAL.—Contract for construction of pile bridge over San Felipe river has been awarded to W. M. Ledbetter, Pacific Electric Bdg., Los Angeles, for $7865. Other bidders were W. A. Patterson, $7965; Mercereau Bridge & Construction Co., $8400. Engineer's estimate was $8300.

EPHRATA, WASH.—Contract for construction of highway bridge near Adrian has been awarded to Albert Simmons, Ephrata, for $1650.

LOS ANGELES, CAL.—City engineer A. C. Hansen has reported that the East First Street bridge is unsafe. Estimated cost of re-building is $250,000.

MERCED, CAL.—Contract for construction of concrete highway-bridge has been awarded to E. K. Engle for $4300.

Contract for construction of county bridge No. 61 has been awarded to W. K. Widenmann, 606 23rd street, Merced, for $1484.

MODESTO, CAL.—Contract for construction of reinforced concrete bridge on Centerville road over main canal of Turlock irrigation district has been awarded to B. T. Owsley, 180 Jessie street, San Francisco, for $12,843. Other bidders were A. H. Vogt, $13,382; C. E. Cotton, $15,937; Alfred McAuley, $17,890; M. Blumenkranz, $17,900.

Contract for construction of several reinforced concrete culverts and siphons has been awarded to B. T. Owsley for $2497. Other bidders were D. E. King, $2685; Frank C. McIntyre, $2985; A. H. Vogt, $3640; and R. Von Voorheis, $3461.

PORTLAND, ORE.—Bids will be received until March 5 by State Highway Commission for construction of concrete bridge over Hood river. Estimated cost is $40,000.

RED BLUFF, CAL.—Bids will be received until March 12 by H. G. Kuhn, county clerk, for construction of two reinforced concrete culverts on the Red Bank road about 13 miles southwest of Red Bluff.

RICHVALE, CAL.—Bids will be received until March 5 by secretary of Richvale drainage district for construction of a 20-ft. reinforced concrete bridge and a reinforced concrete siphon. F. S. Robinson, Chico, is engineer.

SALINAS, CAL.—Board of Supervisors has decided to construct bridge on state highway across Salinas river at King City. Estimated cost is $146,900, of which the county will pay $126,900 and the State Highway Commission the remainder.

SALT LAKE CITY, UTAH.—County will construct 24 concrete bridges over Utah & Salt Lake canal. Estimated cost is $25,000.

SAN FRANCISCO, CAL.—Bids will be received until March 11 at office of Haviland & Tibbetts, Alaska Commercial Bdg., San Francisco, for construction of a wooden highway-bridge near Knights Landing for the Knights Landing drainage district. Bridge consists of a wooden span 165 ft. long and a combination steel-and-wood span 78 ft. long, together with graded approaches. Plans from Haviland & Tibbetts upon deposit of $5.

SAN JOSE, CAL.—Plans for bridge on Santa Clara street over Coyote creek in place of the one that failed recently have been completed and call for bids will be issued soon. Bridge will have a single reinforced concrete arch with 150-ft. span, the roadway being 53 ft. 4 in. wide.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

SEATTLE, WASH.—Bids will be received until March 8 by Board of Public Works for construction of steel superstructure for double-leaf bascule bridge over Lake Washington canal on Eastlake avenue. Estimated cost is $100,000.

WASHINGTON, D. C.—Contract for construction of steel highway-bridge at Farmington, New Mexico, has been awarded to Monarch Engineering Co., Fall City, Nebraska, for $25,000.

WENATCHEE, WASH.—Bids will be received until March 8 by county clerk for construction of 60-ft. concrete arch-bridge over Foster creek, together with approach-fills, requiring 8600 cu. yd. embankment. Estimated cost is $12,000.

YAKIMA, WASH.—Contract for construction of steel bridge across Yakima river near Wapato has been awarded to Illinois Steel Bridge Co., Spokane, for $30,693.

IRRIGATION AND WATER SUPPLY

COLUSA, CAL.—Colusa Land & Water Co. has been organized to farm 10,000 acres of land in this vicinity. Ditches will be constructed. Estimated cost of work is $150,000. J. H. Dockweiler, Crocker Bdg., San Francisco, is interested. Contract for work has been awarded to Suisun Dredging Co., San Francisco.

EL CENTRO, CAL.—Bids will be received until March 7 by F. H. McIver, secretary Imperial irrigation district, for construction of wooden head-gate and a wooden check-gate in Lower California, six miles from Calexico. Plans from Imperial irrigation district, Calexico, upon deposit of $15 for each set.

Edwards & Wildey Co., Black Bdg., Los Angeles, was low bidder at $12,000 for construction of concrete head-gate near Calexico for Imperial irrigation district.

Blee & Sears, 1947 Mateo street, Los Angeles, were low bidders at $16,480 and were awarded the contract for construction of filtration plant for city water system. Other bidders were: A. Thomas, El Centro, $16,808; W. M. Ledbetter, Los Angeles, $18,974; Wattson & Wattson, Los Angeles, $19,992; P. L. Hedrick, El Centro, $24,600.

FILLMORE, CAL.—Bids will be received until March 12 by C. Arrasmith, city clerk, for construction of water system, including a pumping-plant, concrete reservoir, and distribution system. Estimated cost is $60,000. Plans may be obtained from Olmsted & Gillelen, Hollingsworth Bdg., Los Angeles, upon deposit of $1.50.

FRESNO, CAL.—Contract for construction of pipe irrigation system at county farm has been awarded to J. E. Mitchell, Fresno.

MERCED, CAL.—Formation of irrigation district containing 250,000 acres of land in this vicinity is proposed. Most of this land is now served by the Crocker-Huffman Land & Water Co. system. The district would acquire this system and extend it. H. G. Kelsey, C. H. Edwards, and G. T. Parr are interested.

MODESTO, CAL.—Directors of Modesto irrigation district have decided not to join with the directors of the Turlock district in investigating the feasibility of constructing dam No. 2. Estimated cost of dam is $3,000,000. Directors of Turlock district will probably make an independent investigation.

REDDING, CAL.—Election will be held in Happy Valley irrigation district to vote on bond issue of $630,000 for construction of irrigation system. District contains 18,500 acres.

City trustees have decided to postpone construction of municipal water system until after the War. Estimated cost was $252,700.

RIVERSIDE, CAL.—City engineer A. Braunschweiter is preparing plans for replacing 4600 ft. of riveted-steel main supply pipe for city water system with 36-in. concrete pipe. Estimated cost is $27,000.

SACRAMENTO, CAL.—State Board of Control has awarded contract for laying 14 miles of pipe for water system at State Hospital at Napa to D. O. Church, San Francisco, at $0.20 per ft. Pipe is to be furnished by the State. Total estimated cost of work is $55,000.

SAN FRANCISCO, CAL.—Thomas A. Clark, Call Bdg., San Francisco, was low bidder at $3000 for construction of high-pressure water system on Clarendon avenue. Other bidders were: Eaton & Smith, $3175; H. Lotzin, $3300; Thomas Hutton, $3575; Fay Improvement Co., $4190; Raisch Improvement Co., $4850.

SAN RAFAEL, CAL.—Following bids were received by Marin Municipal water district for construction of pipe-line: J. D. Hannah, Chronicle Bdg., San Francisco, $164,821.25; Cahill-Vensano Co., 110 Sutter street, San Francisco, $289,-705.25. Bids were rejected.

SEATTLE, WASH.—Contract for construction of water system composed of 2-in. and 4-in. wood-stave pipe for water district No. 4 has been awarded to Morris & Miller, 3053 16th avenue West, Seattle, for $3519.41.

SONORA, CAL.—Sierra & San Francisco Power Co., which supplies water to city, will construct filtration system. Meters will probably be placed.

WASHINGTON, D. C.—Contract for construction of addition to water system at Navajo Indian School, Arizona, has been awarded to R. F. Yoder, Gallup, New Mexico, for $16,000.

LIGHT, HEAT, AND POWER

HONOLULU, HAWAII.—Hawaiian Electric Co. will build power-plant. Estimated cost is $300,000, not including machinery.

LOS ANGELES, CAL.—Southern Sierras Power Co. has applied to State Railroad Commission for permission to purchase systems of Corona Gas & Electric Light Co., Bishop Light & Power Co., Rialto Light, Power & Water Co., and Coachella Valley Ice & Electric Company.

RED BLUFF, CAL.—E. A. Rollison, Redding, is preparing plans for proposed municipal lighting system.

REDWOOD CITY, CAL.—Contract for furnishing electric lights for the Belmont and Lomita Park highway-lighting districts for a period of five years has been awarded to Pacific Gas & Electric Co., the only bidder.

SALEM, ORE.—Henry S. McGowan has applied to State authorities to divert water at two power-sites, one in Sherman and Wasco counties, and the other in Jefferson county. Estimated cost of power-plants at the two sites is $2,000,000 and $4,000,000 respectively.

SAN PEDRO, CAL.—Electrical Construction Co., San Francisco, was low bidder at $19,436 for construction of underground electric distribution system at Fort MacArthur. Other bidders were: W. A. Carrao, $19,815; F. E. Newberry Electric Co., $19,967; Modern Engineering Co., $21,036.18; Foulkes Engineering Co., $29,000. All Los Angeles bidders unless otherwise noted.

SEATTLE, WASH.—Date of opening bids for construction of municipal hydro-electric plant has been postponed by Board of Public Works until March 15. Alternate bids will be received for construction of plants at several different sites.

WENATCHEE, WASH.—Wenatchee Valley Gas & Electric Co. will construct additional power-plant at Chelan Falls to develop 1000 hp. G. D. Brown is president.

RIVER AND HARBOR WORK

PORTLAND, ORE.—Plans have been completed and call for bids will be issued soon by Port of Portland for construction of grain-elevator, docks, and dock-buildings. Estimated cost is $1,000,000.

RIVERSIDE, CAL.—Board of Supervisors of Riverside, San Bernardino, and Orange counties have appointed committee composed of F. H. Olmsted, A. L. Sonderegger, W. K. Barnard, and J. Quinton to report on flood-control in the Santa Ana river and its tributaries.

SAN DIEGO, CAL.—Bids will be received until March 21 at U. S. Engineer Office, Central Bdg., Los Angeles, for dredging 1,564,000 cu. yd. of material in San Diego harbor. Detailed specifications on file at office of 'Western Engineering'.

SAN FRANCISCO, CAL.—Following bids were received by State Board of Harbor Commissioners for construction of pier-shed and bulkhead building on pier No. 3. The first figure refers to proposition No. 1 and the second, when given, to proposition No. 2: J. D. Hannah, Chronicle Bdg., San Francisco, $102,814, $103,314; Val Franz, $106,880, $107,200; Healy-Tibbitts Construction Co., $112,800, $112,000; Robert Trost, $103,986; Hayes-Oser Co., $104,990, $105,290. Contract was awarded to J. D. Hannah under proposition No. 2 which provides that the cement-plaster be applied by machinery.

State Board of Harbor Commissioners has awarded contract for paving Fisherman's Wharf to Raisch Improvement Co., Crocker Bdg., San Francisco, for 8.87c. per square foot.

SEATTLE, WASH.—Puget Sound Bridge & Dredging Co. Seattle, was low bidder at $0.265 per cu. yd., or $92,750 in all, for dredging material from Lake Washington ship-canal. Erickson Construction Co. bid $0.32.

RAILROAD WORK

ALAMEDA, CAL.—City council has appropriated $20,000 for construction of railroad from Pearl street to plant of Alaska Packers' Association.

LAKEPORT, CAL.—Director of Railroads, W. G. McAdoo,

Generated on 2024-09-30 01:37 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

has consented to construction of railroad from Hopland to Lakeport. Contract for this work has already been awarded to G. L. Hardison, Rialto Bdg., San Francisco. Estimated cost is $350,000.

LOS ANGELES, CAL.—Pacific Electric Railway will double-track its line from Long Beach to San Pedro. Estimated cost is $200,000.

OAKLAND, CAL.—Construction of municipal street-railroad from 34th and Wood streets to Elmhurst by way of inner harbor is proposed.

PORTLAND, ORE.—Commission of Public Docks has awarded contract for construction of short railroad near St. Johns to Edward Sandberg, Portland, for $28,000.

SAN FRANCISCO, CAL.—Eaton & Smith, 407 11th street, San Francisco, were low bidders at $28,600 and were awarded contract for construction of municipal street-railroad on Greenwich street between Scott and Baker streets. Other bidders were H. Lotzin, $29,825; Fay Improvement Co., $32,345; Thomas A. Clark, $37,945; Federal Construction Co., $38,000.

Contract for construction of municipal railway along Market street from Geary street to Van Ness avenue has been awarded to Western Contracting Co., 373 Noe street, San Francisco, for $130,000. Eaton & Smith and the Federal Construction Co. also bid on this work. Engineers' estimate was $120,000.

State Railroad Commission has granted permission to Tidewater Southern Railway Co. to sell $500,000 worth of bonds to Western Pacific Railway Co. Money is to be used for completion of main line from Stockton to Stevenson and of branch line from Small to Manteca.

WESTPORT, CAL.—Santa Fe Railroad has taken over holdings of timber-land in this vicinity formerly owned by the Standish-Hickey Lumber Co. Mill and wharf will be constructed at Westport and a logging-railroad up Wages creek.

BUILDING CONSTRUCTION

ANAHEIM, CAL.—Elks Club will construct $50,000 building.

BANDON, ORE.—Contract for construction of a condensed-milk plant for Giebish & Joplin has been awarded to Thomas Muir, Chamber of Commerce Bdg., Portland, for $100,000.

BERKELEY, CAL.—C. A. Tantau, Clunie Bdg., San Francisco, is preparing plans for apartment-house. Estimated cost is $15,000.

BOZEMAN, MONT.—Contract for construction of high-school building has been awarded to H. J. Hammil, Bozeman, for $104,865.

BREMERTON, WASH.—Contract for construction of brick hotel-building for G. H. Mosher has been awarded to Dow & Ryden, Seattle, for $30,000.

CALEXICO, CAL.—Imperial Valley Ice & Development Co. will construct ice-plant. Estimated cost is $130,000.

CHENEY, WASH.—Fred A. Wilson Engineering Co., Central Bdg., Seattle, is preparing plans for concrete and mill-construction grain-elevator and other buildings to be erected by the F. M. Martin Grain & Milling Company.

CASHUP, WASH.—Cashup Elevator Co. will construct grain-elevator. Estimated cost is $50,000.

DUNCAN'S MILLS, CAL.—Summer-resort buildings costing $250,000 will be constructed. S. I. Ginsburg, J. J. Scanlan, and David Kluppfer, all of Chicago, are interested.

ELKO, NEV.—Plans are being prepared by W. H. Parker, Hearst Bdg., San Francisco, for brick and frame buildings at county hospital. Estimated cost is $90,000. Call for bids will be issued soon.

EL SEGUNDO, CAL.—Darrell Condley, Marsh-Strong Bdg., Los Angeles, was low bidder at $15,900 for construction of municipal building.

FAIRFIELD, CAL.—L. M. Turton, 144 South Main street, Napa, is preparing plans for brick and reinforced concrete building for First National Bank. Estimated cost is $15,000.

FRESNO, CAL.—H. H. Winner, Nevada Bank Bdg., San Francisco, is preparing plans for alterations to building of Union National Bank. Call for bids will be issued March 10.

Contract for construction of reinforced concrete drying-plant for California Products Co. has been awarded to Cahill-Vensano Co., San Francisco, for $60,000.

California Associated Raisin Co. will construct packing-houses at Biola, Cutler, Las Palmas, Selma, and Seville.

Contract for construction of reinforced concrete packing-house for Paul Mosesian has been awarded to Trewhitt-Shields Co., Fresno, for $150,000.

A. Werner, San Francisco, is preparing plans for class A building to be erected by Scottish Rite Association. Estimated cost is $100,000.

R. F. Felchin, Fresno, will construct addition to plant of Consumers' Ice Co. Estimated cost is $15,000.

GERMANTOWN, CAL.—Andrew Kaiser will construct grain-elevator. Estimated cost is $12,000.

HANFORD, CAL.—Contract for construction of brick and concrete building for Cousins Tractor Co. has been awarded to J. F. Brown, Hanford, for $11,000.

Contract for construction of reinforced concrete grain-elevator for Lacey Milling Co. has been awarded to Trewhitt-Shields Co. for $20,000.

HONOLULU, HAWAII.—Contract for construction of building for Hawaiian Electric Co. has been awarded to Woolley & Beeton, Honolulu, for $218,917.

HUNTINGTON PARK, CAL.—A. L. Read, Long Beach, is preparing plans for hotel and store building. Estimated cost is $50,000.

KING CITY, CAL.—Schroeder & Reich will construct $75,000 hotel-building.

KLAMATH FALLS, ORE.—Contract for construction of building for Klamath State Bank has been awarded to Trenchell & Parcelius, Portland, for $16,000.

Bids will be received until March 20 by E. E. McClaren, Lumber Exchange Bdg., Portland, for remodeling and completing the present courthouse building. Estimated cost is $200,000.

F. Johnson, Oregon Bdg., Portland, is preparing plans for brick building to be erected by D. C. Williams. Estimated cost is $100,000.

LONG BEACH, CAL.—A. L. Read, National Bank Bdg., Long Beach, is preparing plans for a three-story brick apartment-house. Estimated cost is $35,000.

National Bank of Long Beach will remodel building. Estimated cost is $15,000.

LOS ANGELES, CAL.—Norman F. Marsh and Herbert C. Howard, Broadway Central Bdg., Los Angeles, are preparing plans for additional brick building for Hollywood high school. Estimated cost is $50,000.

Contract for construction of reinforced concrete building for William and Richard Lacy has been awarded to Henry Clarke Co., 1101 East 5th street, Los Angeles, for $93,134.

William Davidson, Hall of Records, Los Angeles, is preparing plans for joint tuberculosis sanitarium to be constructed by Los Angeles, Santa Barbara, and Ventura counties. Estimated cost is $100,000.

Contract for construction of reinforced concrete theatre-building for J. B. Lankershim has been awarded to Winter & Nicholson, 2141 Sacramento street, Los Angeles, for $100,000.

Contract for construction of cannery for Italian Canning Co. has been awarded to J. S. Crandall, 911 West 40th place, Los Angeles, for $40,000.

McFARLAND, CAL.—Contract for construction of frame hotel-building for Marion Olsen has been awarded to Currie & Dulgar, Bakersfield, for $11,335.

NEVADA CITY, CAL.—Contract for construction of two concrete buildings at county hospital has been awarded to Fred Warden, 354 Sussex street, San Francisco, for about $25,000. Contract for heating system has been awarded to Thomas J. Kennedy, Martinez; for plumbing to Grass Valley Hardware Co.; and for electrical work to Globe Electric Co., San Francisco.

OAKLAND, CAL.—Weeks & Day, Phelan Bdg., San Francisco, are preparing plans for alterations to interior of Macdonough theatre. Estimated cost is $200,000.

Contract for construction of brick garage for M. C. Chapman has been awarded to J. F. Dingwell for $11,060.

W. E. Cannon, Central Bank Bdg., Oakland, is preparing plans for brick addition to building at San Pablo avenue and 16th street. Estimated cost is $50,000.

Following bids were received for construction of cottage at county infirmary: Charles W. Heyer Jr. (awarded contract), $21,280; Alfred Olsen, $21,299; E. T. Leiter & Sons, $21,387; A. C. Wieben, $21,540; Walter Sorenson, $22,467; J. C. Nielsen, $22,964; N. W. Place, $22,982; A. Cederborg, $23,450; W. G. Thornally, $23,673; Schnably & Howstrawser, $24,209; John B. Perona, $24,875; E. A. Randlett, $24,889.

OKANOGAN, WASH.—Bids will be received until March 12 by Commercial Bank of Okanogan for construction of building. N. W. Bird, Wenatchee, is architect.

OLYMPIA, WASH.—M. J. Westerfield, Tacoma, was low bidder at $35,843 for construction of building at State School for Deaf at Vancouver. Other bidders were H. F. Ollan, $36,800; S. G. Morin, $38,449; S. C. Erickson, $39,329; Finn & Gjard, $41,697.

ORANGE, CAL.—Contract for construction of depot-building for Pacific Electric Railway has been awarded to R. S. Martin, Alhambra.

PALO ALTO, CAL.—Bank of Palo Alto will construct building.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

PATTERSON, CAL.—Western Meat Co. will construct creamery.

PORTLAND, ORE.—Following bids were received for construction of municipal detention home: A. M. Hocken, Beaverton (awarded contract), $15,500; Hoover & McNeil, Albany, $16,466; Green & Green, $17,557; R. O. Powers, $17,699; James L. Quinn, $17,854; J. Zwick, $18,105; Anton Selter, $18,467; D. E. Steele, $19,989; J. F. Hand, $20,708.

J. M. Dougan Co. was low bidder at $218,863 for construction of building for Hawthorne-Buckman school. Parker & Banfield bid $223,937 and Bingham-McClelland Co., $224,600. All Portland firms.

REEDLEY, CAL.—Growers Co-operative Co. will construct packing-house.

RENO, NEV.—W. O. Lewis, Gazette Bdg., Reno, is preparing plans for brick, stucco, and wood buildings to be erected by Premier Film Corporation. Estimated cost is $50,000.

RIO VISTA, CAL.—Contract for construction of brick garage for H. B. Holmes has been awarded to T. Rutherford, Rio Vista, for $16,278. Other bidders were F. A. Holdener, $16,576; C. J. Guth, $16,640; T. A. McDougall, $16,960; M. Bruesk, Rio Vista, $17,520. All Sacramento bidders unless otherwise noted.

RIVERSIDE, CAL.—William Beretti will construct cannery. Estimated cost is $40,000.

Contract for construction of buildings at Government aviation base in Perris valley has been awarded to Twohy Bros., San Francisco. Estimated cost is $1,500,000.

Contract for making additions to hospital has been awarded to L. C. Waldman for $6300.

SACRAMENTO, CAL.—Bids will be received until March 12 by W. F. McClure, State Engineer, for construction of agricultural pavilion at State Fair Park. Segregated bids will be received on carpenter work, including sheet metal, composition roofing, glazing, plastering, and painting, on terra cotta and tile-roofing, on ornamental-iron work, on masonry, including brick work, and on plumbing, sewers, and heating. Plans from State Engineer upon deposit of $15 for each part of the work.

George W. Boxton & Son, Hearst Bdg., San Francisco, were low bidders at $18,442 for construction of gymnasium-building at Santa Barbara State Normal school. Other bidders were Edwards & Wildey, $21,500; Kling Co., $22,278; M. Johnson, $26,500; A. H. Vogt, $26,950.

James L. Daly, Fresno, was low bidder at $8880 for completion of gymnasium-building and construction of swimming-pool at Fresno State Normal School. Other bidders were G. W. Boxton & Son, $9165; Robert Balcke, $9175; Frederickson & Shannon, $9595; L. G. Bergren & Son, $9872; A. H. Vogt, $11,670.

Central Iron Works, San Francisco, was low bidder for furnishing steel for agricultural hall at State Fair Grounds. C. A. Blume, San Francisco, was low bidder at $11,000 for erection of steel.

Government will establish aviation school 12 miles east of Sacramento. Several buildings will be constructed.

Contract for construction of cottages at Norwalk State Hospital has been awarded to J. F. Atkinson, Story Bdg., Los Angeles, for $117,947.

SAN DIEGO, CAL.—W. H. Wheeler, Union Oil Bdg., Los Angeles, is preparing plans for apartment-house. Estimated cost is $50,000.

Steele Packing Co., has applied for a lease to part of city tide-lands. Fish-cannery will be constructed costing $70,000.

SAN FERNANDO, CAL.—Contract for construction of cannery for San Fernando Canning Co. has been awarded to Paul C. McAbee, 721 West Ninth street, Glendale. Estimated cost of building is $25,000 and of equipment $45,000 more.

SAN FRANCISCO, CAL.—Contract for reconstruction of brick warehouse for H. H. Wilkins has been awarded to F. E. Southworth, 7 Laurel street, San Francisco, for $10,000.

J. Cahen, 333 Kearny street, San Francisco, is preparing plans for two brick apartment-houses. Estimated cost $65,000 and $120,000, respectively.

J. C. Hladik, Monadnock Bdg., San Francisco, will have charge of construction by day-labor of concrete apartment-house for J. L. Hocking. Estimated cost is $20,000.

Contract for construction of first unit of plant of American Can Co., at Fruitvale, has been awarded to Lindgren Co., Monadnock Bdg., San Francisco. Building will be of frame. Estimated cost is $16,000. About 50,000 cu. yd. embankment will be required.

J. W. Dolliver, 201 Sansome street, San Francisco, is preparing plans for two reinforced concrete factory-buildings. Estimated cost is $15,000 to $25,000, respectively.

Contract for construction of store-building for Owl Drug Co. at Market and Powell streets has been awarded to O. Duval & Son, Dalziel Bdg., Oakland.

Bids will be received until March 13 by Quartermaster Department, Fort Winfield Scott, for construction of a two-story reinforced concrete office-building. Estimated cost is $12,000.

Contract for construction of brick building for Walter Sullivan has been awarded to Macdonald & Kahn, Rialto Bdg., San Francisco, for $40,000.

Contract for construction of frame machine-shop building for Associated Oil Co. has been awarded to MacDonald & Kahn, Rialto Bdg., San Francisco, for $25,000.

W. H. Elleson, 251 Kearny street, San Francisco, has charge of construction by day-labor of concrete building for W. R. Berry. Estimated cost is $28,000.

R. F. Chevalier, Merchants Exchange Bdg., San Francisco, is preparing plans for brick buildings to be erected in Marin county by Mason Distilling Co. Estimated cost is $300,000. Bids are being received for furnishing material.

C. H. Skidmore, Call Bdg., San Francisco, is preparing plans for frame apartment-house for Henry Black. Estimated cost is $20,000.

Board of Education has requested Board of Public Works to prepare plans for four new school-buildings. Total estimated cost is $880,000.

SAN JOSE, CAL.—Contract for making alterations in Bank of Italy building has been awarded to Larsen-Sampson Co., Crocker Bdg., San Francisco, for $25,000.

SAN PEDRO, CAL.—Contract for construction of class C theatre and store building for N. O. Anderson has been awarded to Lilly-Fletcher Co., Investment Bdg., Los Angeles.

SANTA CLARA, CAL.—Pratt-Low Canning Co. will construct several reinforced concrete buildings. Estimated cost is $39,000.

SEATTLE, WASH.—Sears, Roebuck & Co. will construct $250,000 office-building.

Contract for construction of brick apartment-house for Mrs. R. Freed has been awarded to McRae Bros., Seattle, for $50,000.

Contract for construction of oil terminal plant on Harbor island for Rogers-Brown Co. has been awarded to Puget Sound Bridge & Dredging Co., Central Bdg., Seattle, for $300,000.

Centennial Mill Co., Hoge Bdg., Seattle, will construct $300,000 flour-mill.

Hans Pederson, Alaska Bdg., Seattle, will construct brick apartment-house. Estimated cost is $28,000.

SNOWFLAKE, ARIZ.—J. M. Cooper, Marsh-Strong Bdg., Los Angeles, is preparing plans for brick school-buildings. Estimated cost is $30,000.

SPOKANE, WASH.—Hutter Construction Co., Spokane, was low bidder at $85,140 for construction of tuberculosis sanitarium at Edgecliffe. J. B. Sweatt bid $87,400. Hutter Construction Co. withdrew its bid, and the contract was awarded to J. B. Sweatt.

STOCKTON, CAL.—Chang Wah Co. will construct brick hotel-building. Estimated cost is $100,000. Work is to be done by day-labor under the direction of Franklyn E. Warner, Belding Bdg., Stockton.

Sala & Mayo, Commercial & Savings Bank Bdg., Stockton, are preparing plans for concrete school-building to be erected near Escalon.

TACOMA, WASH.—Contract for construction of amusement buildings at Camp Lewis has been awarded to Donnelan, Molloy & Lamont, Tacoma, for $45,000.

Edward Miller will construct concrete and hollow-tile apartment-house.

TAFT, CAL.—Contract for construction of brick building for Security Trust Co., has been awarded to D. A. Evans, Fresno.

TRACY, CAL.—Contract for construction of frame hotel-building for Pacific Sugar Corporation has been awarded to Gutleben Bros., Call Bdg., San Francisco.

VALLEJO, CAL.—L. M. Turton, 144 South Main street, Napa, is preparing plans for brick and reinforced concrete building for Vallejo Methodist Church. Estimated cost is $30,000.

Contract for construction of medical-supply depot at Mare Island Navy Yard has been awarded to L. G. Bergren & Son., Call Bdg., San Francisco, the low bidders, for $75,302.

VANCOUVER, B. C.—Contract for construction of mill-construction building on creosoted piling for Canadian Fishing Co. has been awarded to A. W. Quist Co., Hoge Bdg., Seattle, for $50,000.

VISALIA, CAL.—Proposed tuberculosis hospital at Springsville will be constructed by Kings and Tulare counties only, Kern county having withdrawn from the agreement.

WALLA WALLA, WASH.—Contract for construction of concrete grain-elevator for Walla Walla Warehouse & Elevator Co. has been awarded to Alloway & George, Spokane, for $35,000.

WASHINGTON, D. C.—Bids will be received until March 7 by Cato Sells, commissioner of Indian Affairs for construction of frame dormitory at Tohatchi Indian School, New Mexico. Plans on file at U. S. Indian Warehouse, San Francisco.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Construction of the following army buildings has been authorized and contracts will be awarded soon: Cantonments near Honolulu. Barracks for Coast Artillery at San Diego, Los Angeles, Puget Sound, and Columbia.

WENATCHEE, WASH.—Peshastin Fruit Growers Association will construct packing-house. Estimated cost is $30,000.

WHITTIER, CAL.—Contract for construction of addition to brick garage for Murphy Oil Co. has been awarded to Nance Construction Co., Los Angeles.

BONDS

BERKELEY, CAL.—Bids will be received until March 12 by A. G. Briggs, city clerk, for the purchase of $19,482.90 worth of bonds covering improvement of parts of Hopkins street.

BLYTHE, CL.—Bond issue of $1,200,000 for levee work has been voted in Palo Verde reclamation district.

BRAWLEY, CAL.—Election will be held March 6 to vote on bond issue of $70,000 for construction of school-buildings.

CALISTOGA, CAL.—Bond issue of $40,000 for purchase of water system has been sold to McDonnell & Co., San Francisco.

EMERYVILLE, CAL.—Bond issue of $60,000 for construction of school-building has been voted.

ESPARTO, CAL.—Bond issue of $15,000 for construction of water system is proposed.

MARTINEZ, CAL.—Bond issue of $200,000, $170,000 for purchase of water system for municipal supply and $30,000 for construction of sewers, has been voted.

MERCED, CAL.—Board of Supervisors has decided to call election in August to vote on bond issue of $1,250,000 for construction of county highway system.

NEWPORT BEACH, CAL.—Bids are being received by city clerk for purchase of $50,000 worth of bonds for harbor improvement.

SEATTLE, WASH.—Bond issue of $15,000 of Independent highway district No. 2 has been sold to John E. Price & Co. for $15,022.

SELAH, WASH.—Bids will be received until March 12 by Board of Directors of Naches-Selah irrigation district for the purchase of $300,000 worth of bonds of the district.

SONOMA, CAL.—Election will be held on April 8 to vote on bond issue for purchase of water system.

STOCKTON, CAL.—Island Transportation Co. has awarded contract for construction of ten motor passenger-boats to Stephens Bros., Stockton, for $130,000.

TAFT, CAL.—Bond issue of $25,000 for purchase of land, construction of engine-house, and purchase of fire-apparatus has been voted.

TWIN FALLS, IDA.—Bond issue of $375,000 for construction of water system has been sold to Walter Bruce, Spokane, for 101.54 and accrued interest. The bonds bear 6% interest, and are to be redeemed in 10 to 20 years.

WILLOWS, CAL.—Election will be held in Lake district to vote on bond issue of $14,000 for construction of school-building.

MACHINERY AND SUPPLIES

EUREKA, CAL.—Contract for furnishing water-pipe to city has been awarded to Baker & Hamilton, San Francisco, for $2400.

FRESNO, CAL.—Contract for furnishing fire-truck with chemical apparatus to city has been awarded to American-La France Co. for $7050.

Bids will be received until March 14 by county clerk for furnishing 100,000 bbl. of road-oil.

GRASS VALLEY, CAL.—Contract for furnishing sewer pipe to city has been awarded to Alpha Hardware Company.

LOS ANGELES, CAL.—Contract for furnishing three motor-trucks for oil-spraying equipment has been awarded to Moreland Motor Truck Co. for $4000 each.

California Portland Cement Co. was low bidder for furnishing 5000 bbl. cement to city at $1.5775 per bbl. Other bidders were: Golden Gate Portland Cement Co., $1.905; Southwestern Portland Cement Co., $2.045; Riverside Portland Cement Co., $2.2375. All prices are net f.o.b. Los Angeles.

Contract for supplying three oil-spraying equipments to city has been awarded to Baker Iron Works for $4320.

McKENNA, WASH.—McKenna Lumber Co. is in the market for iron or steel for one 145 or 150-ft. through Howe truss railway bridge, standard gauge, designed for Cooper's E-50 loading, or heavier. Will consider second-hand material if in good condition.

MODESTO, CAL.—Contract for furnishing hardware for new high-school building has been awarded to Turner Hardware & Implement Co. for $2100.

PASADENA, CAL.—Contract for furnishing a deep-well turbine pump to city has been awarded to Byron Jackson Iron Works. Contract for furnishing motor has been awarded to Electrical Machinery Company.

SAN FRANCISCO, CAL.—Bureau of Foreign and Domestic Commerce, 306 Custom House, has information regarding company in China that is in the market for 1375 tons of 70-lb. railroad rails and 100 thirty-ton coal-cars.

Bureau also has information regarding man in French Indo-China that is in the market for a stump-puller. Refer to No. 26392.

Bureau also has information regarding city in Peru that is in the market for bathroom fixtures.

Bureau also has information regarding man in Ecuador that is in the market for oil-refinery equipment.

Bureau also has information regarding city in Chile that is in the market for a garbage-crematory, a motor-driven street-sweeping machine for cobble pavements, a motor-driven ambulance, and a motor-driven street-sprinkler. Refer to No. 26410.

Bureau also has information regarding firm in Straits Settlements that is in the market for sanitary cast-iron enamel goods. Refer to No. 26442.

Bureau also has information regarding city in Straits Settlements that is in the market for complete equipment for portland-cement plant with a capacity of 100 tons per day, also cooperage plant for making cement barrels.

Bureau also has information regarding city in Canada that is in the market for two fire-engines, one a combined pumping-engine and hose-truck carrying 2000 ft. of hose, and with a pumping capacity of 1000 gal. per minute, and the other a ladder-truck. Total estimated cost is $22,100.

Bureau also has information regarding city in Straits Settlements that is in the market for equipment for a plant for making sand-lime brick, capacity 20,000 bricks per day.

Bureau also has information regarding merchant in Bolivia that is in the market for mining equipment, tools, explosives, oils, greases, and machinery. Refer to No. 26386.

The following bids were received by Board of Public Works for furnisihng air-compressors for Hetch-Hetchy project: Worthington Pump Works, $24,142.40 (awarded contract); Sullivan Machinery Co., $25,260; Ingersoll-Rand Co., $26,095; Chicago Pneumatic Tool Co., $24,768.

Contract for furnishing steel for building for Old Homestead Bakery has been awarded to Central Iron Works for $28,000.

SAN JOSE, CAL.—W. J. Benson was low bidder at $4250 for furnishing a 20-35 Yuba ball-tractor to county. Garden City Improvement & Vehicle Co. bid $4700.

SANTA ROSA, CAL.—City council has asked for estimates of cost of motor-driven fire-engine.

SEATTLE, WASH.—Contract for furnishing 500,000 incandescent lamps to city has been awarded to Pacific Lamp & Supply Company.

STOCKTON, CAL.—American La France Co. bid $10,500 and Seagrave Co., $11,000 for furnishing fire-engine to city. Contract was awarded to American La France Company.

Following bids were received for furnishing 2500 ft. of 2½-in. fire-hose to city: Republic Rubber Co., $0.90 and $1 per ft. according to quality; Bowers Rubber Co., $0.90, $1, and $1.10; American Rubber Co., $1.10; Stockton Implement Co., $1.45.

VALLEJO, CAL.—Bids will be received until March 18 at Mare Island Navy Yard for the purchase of a quantity of condemned material, including boats, ventilating sets, motors, engine parts, and chain-hoists.

WALLA WALLA, WASH.—George Ludwigs, 111 Main street, Walla Walla, is in the market for electric water-heaters.

WASHINGTON, D. C.—Bids will be received until March 6 by Chief Clerk, Department of Agriculture, for furnishing telephone and fencing materials and field equipment at the Forest Service Supply Depot, Ogden, Utah, during the fiscal year beginning July 1. Particulars from Purchasing Agent, Forest Service, Ogden.

YUBA CITY, CAL.—Bids will be received until March 5 by Alvin Weis, county clerk, for furnishing five oil-burning tractors.

MISCELLANEOUS

ALAMEDA, CAL.—Howard C. Holmes, 112 Market street, San Francisco, is preparing plans for shipbuilding plant to be constructed by Rolph Shipbuilding Co. Estimated cost is $250,000.

BERKELEY, CAL.—D. V. Mahoney, Oakland, has applied to city for a lease on part of the city water-front.

BREMERTON, WASH.—W. B. Lance, Seattle, was low bidder at $11,800 for construction of a reinforced concrete retaining-wall for city. There were three other bidders. All bids were rejected and work will be re-advertised.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN